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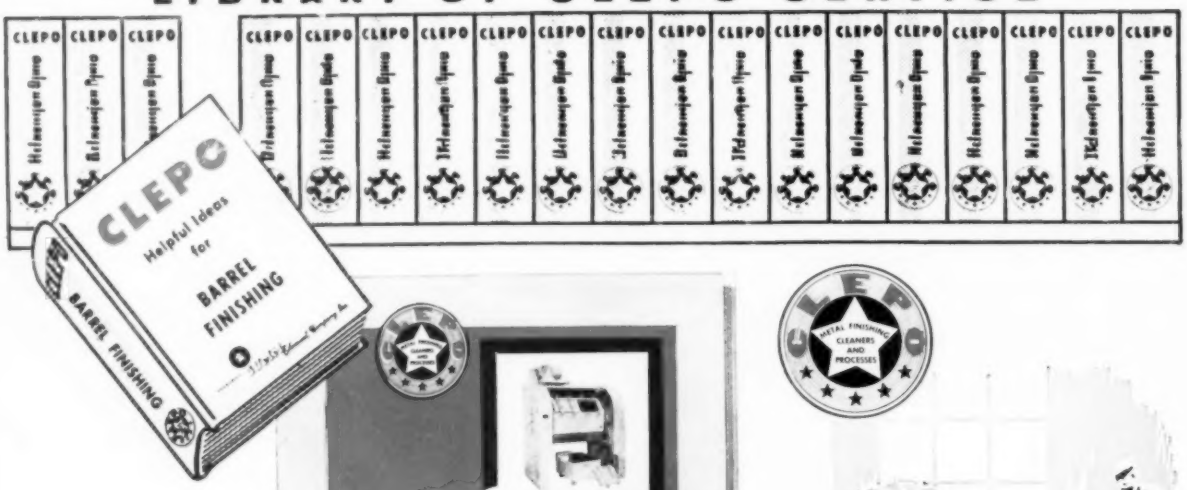

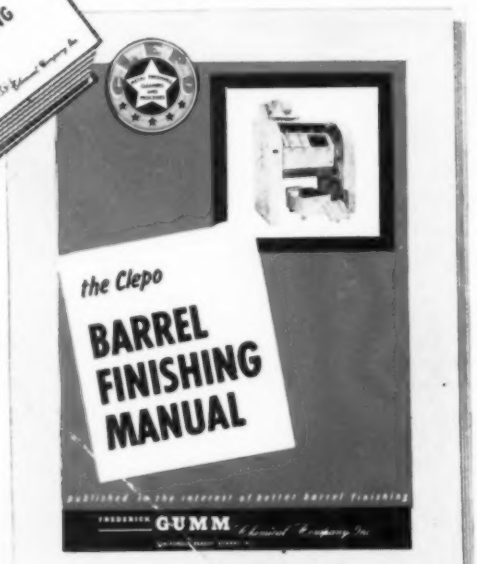

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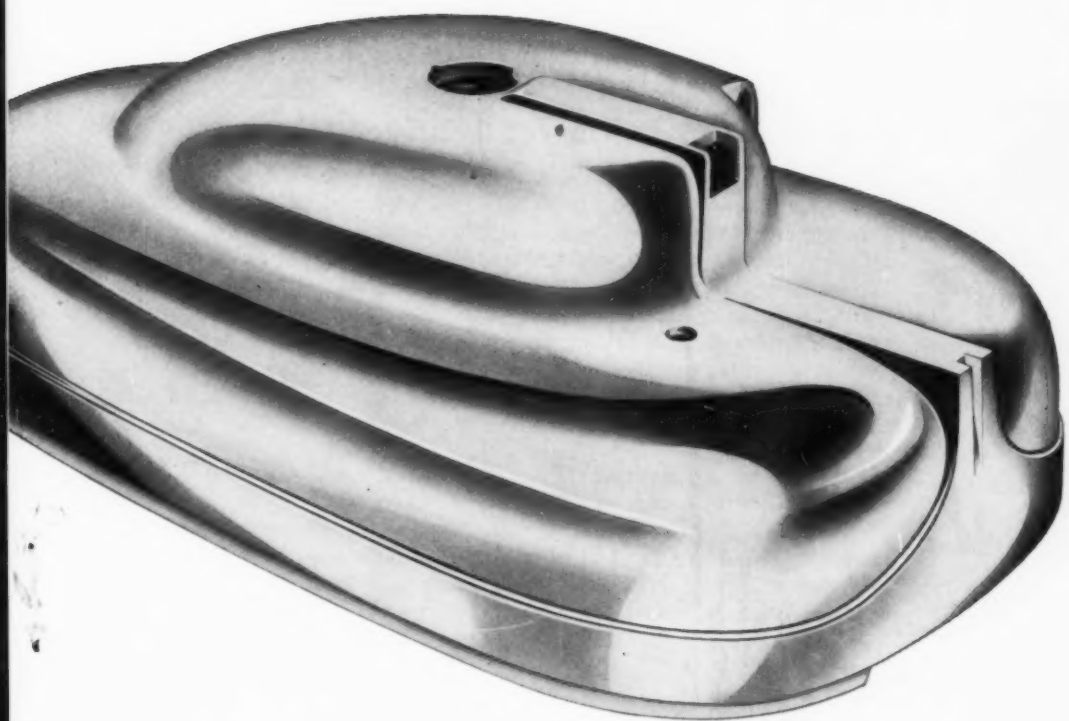

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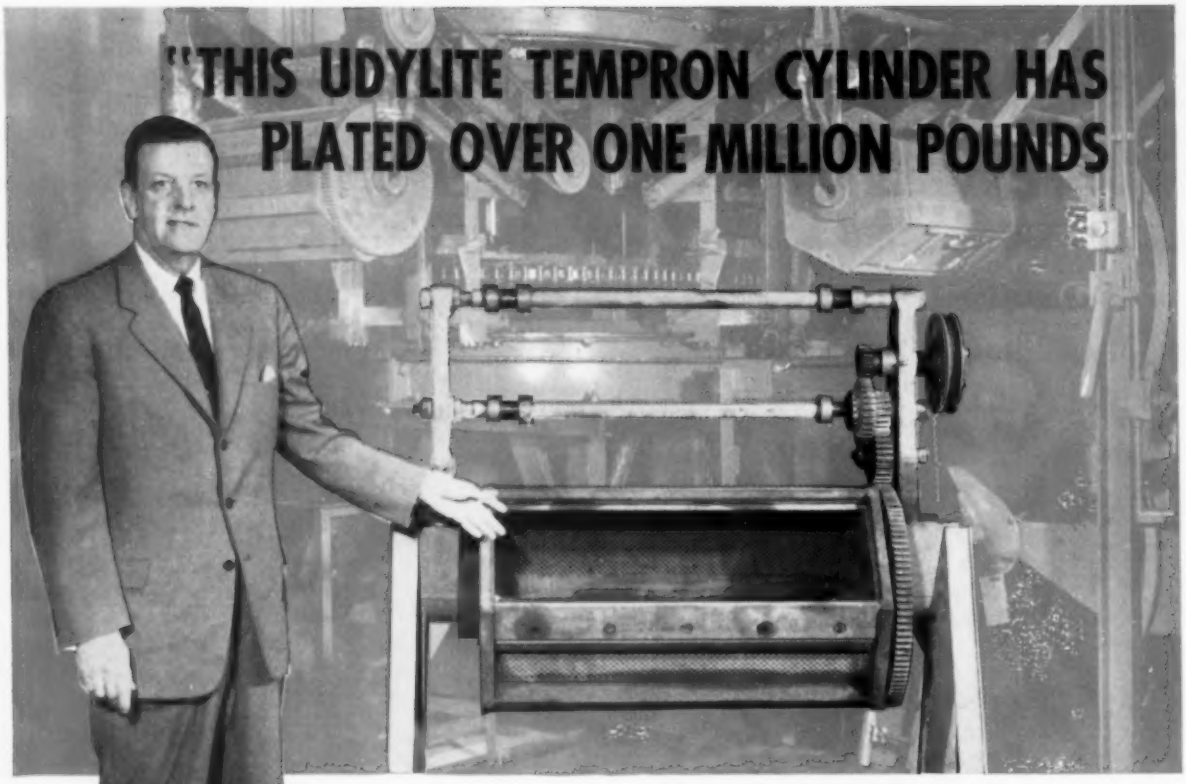

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plating

Journal of the American Electroplaters' Society

May 1958 — **Vol. 45, No. 5**

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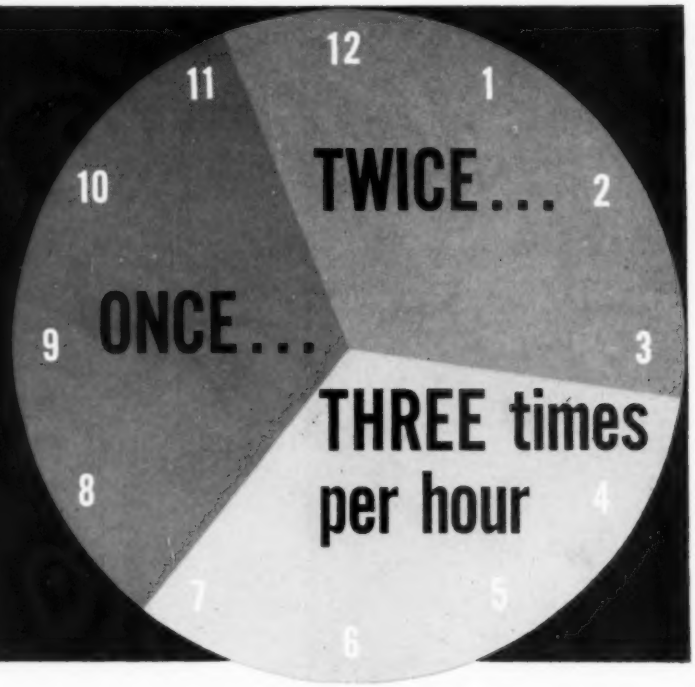
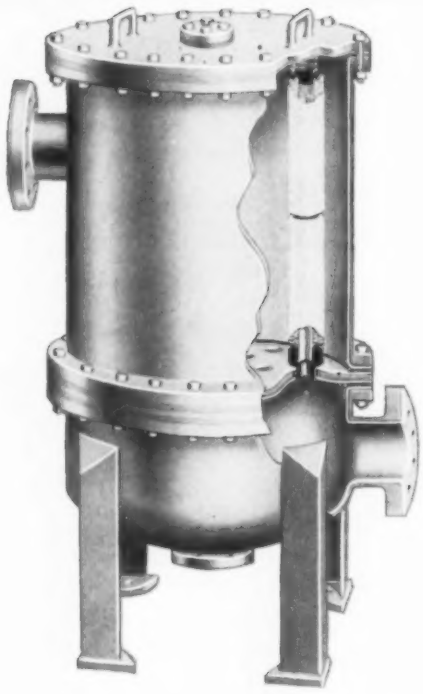
Published monthly at 5800 N. Marvine St., Philadelphia 41, Pa. Entered as second class matter July 1, 1946, at the Post Office at Philadelphia, Pa., under Act of August 24, 1916.

Fulflo FILTERS provide COMPLETE tank turnover—





It's no longer costly to get complete tank turnover three times per hour. And you don't need big, cumbersome filters to do it! Inexpensive, compact Fulflo Filters remove impurities as fast as they're formed and assure flawless plating quality — by providing *triple tank turnover each hour*. This gives you complete solution filtration up to four times in an eight-hour day. The conventional way — tank turnover once each hour — actually provides complete filtration of the solution only once in six hours.

Low-cost Honeycomb Filter Tubes last 6 to 12 weeks and can be renewed in a few moments. There's no maintenance cost between changes. And filtration starts again the moment new elements are inserted. There's no costly downtime while cake is built up. There are no plates, screens, bags, papers or filter aids.

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EDITORIAL

"THE TORCH"

ORDINARILY, at this time of year, the picture of the tired Ancient Greek Marathon runner passing the torch to the fresh youth full of vigor depicts the annual transition of officers. However, I am mainly concerned with the torch that is AES itself and the light from this torch which is the benefits of our Society. That light is getting ever stronger and ever more influential in this scientific age.

During the several years since the organization of the American Electroplaters' Society it has grown in many directions. It has become strong in members, has undertaken important research work, continually expanded its service to its members and the industrial community, and has become a truly important influence in present-day scientific educational programs.

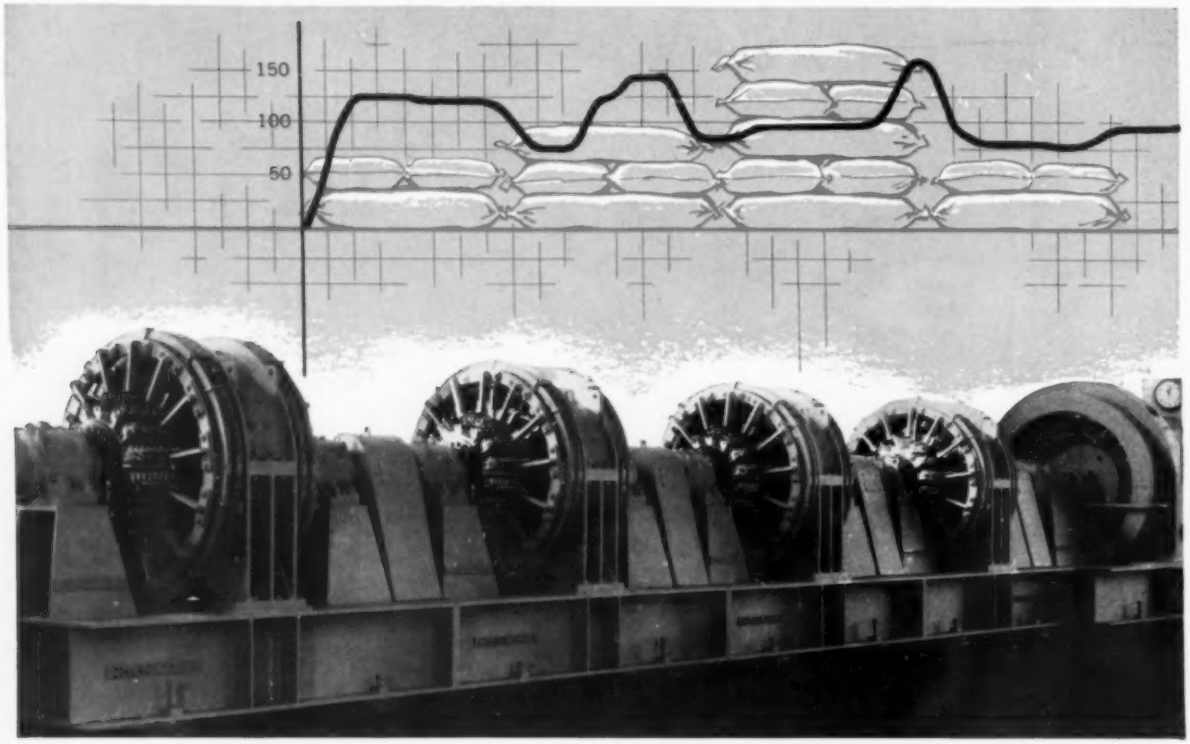
Each one of us, as a member of AES, is responsible for the effect of this light in the world by adding to the fund of knowledge and by teaching to those who wish to learn. Also, by using the knowledge available, we increase the intensity of this light. By supporting the Research Program, getting new members, serving on the many committees, and by aiding the work of the Society in many ways, we hold this light higher. Participation by many is the key.

It is my great hope that during this year just passed we all have made the light of AES just a little brighter and a little higher. May it ever continue to grow in service!

J. J. Eddy

President

EXTRA **stamina**...WHEN YOU NEED IT MOST



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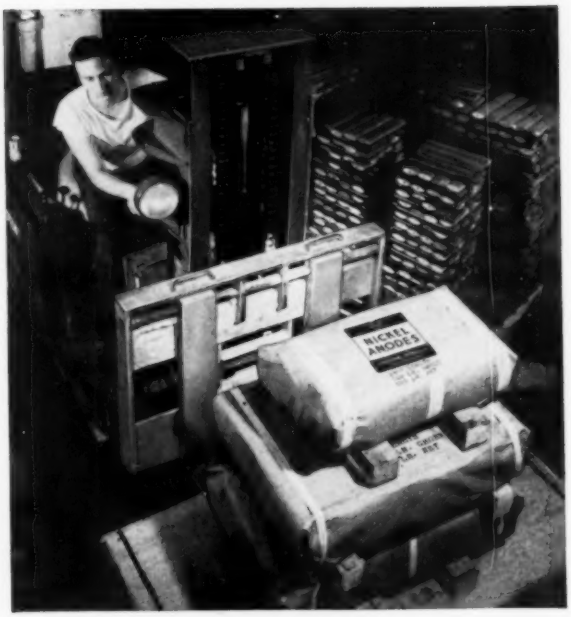

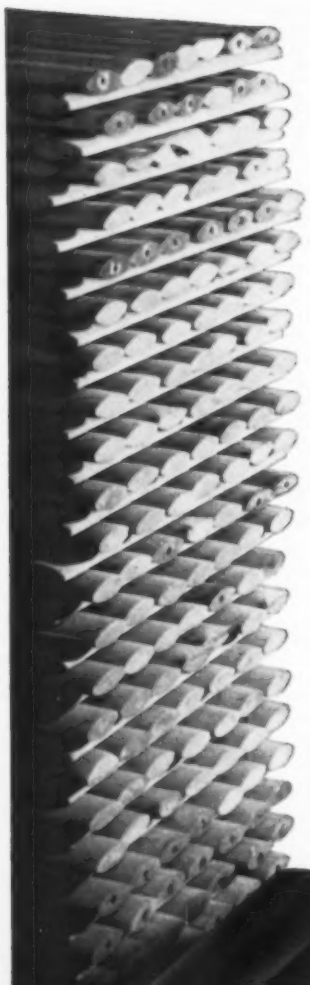

HARSHAW XXX CAST CARBON NICKEL ANODES are oval 1½" x 3" in cross section and are available in any length desired. Weight is approximately 1.1 lbs. per linear inch. They are normally used in dull, semi bright and bright nickel plating baths where the pH is 4.5 or lower.

HARSHAW ROLLED OVAL CARBONIZED NICKEL ANODES are 1¼" x 3" in cross section and are available in any length desired. Weight is approximately 1 lb. per linear inch. They are generally used in dull, semi bright and bright nickel plating baths where the pH is 4.5 or lower.

HARSHAW ROLLED OVAL DEPOLARIZED NICKEL ANODES have the same cross section and weight as the rolled oval carbonized nickel anode and are also available in any length desired. These anodes are generally used in nickel plating baths where the pH is 4.0 or higher; they are extremely suitable for such use, as they will corrode well over a wide range of operating conditions.

PACKAGES

Harshaw anodes are wrapped in a fibre reinforced laminated (without asphalt) paper. They are protected from tramp oils, dirt and grease and remain clean until used. The possibility of such contaminents being introduced into the plating solution from anodes is thus kept to a minimum.

Harshaw anodes are shipped in compact packages which feature built-in skids and facilitate quick handling by mechanical or hand trucks. The packages stack easily and quickly. Also, no deposits or returnables are involved with this type of packaging.

Harshaw Nickel Anodes are readily available and prompt shipment of any quantity will be made upon receipt of your order.

HARSHAW

Recasting Service

Our foundry facilities are available for recasting nickel anode scrap. Contact your nearest Harshaw Branch for further details.

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1945 E. 97th Street • Cleveland 6, Ohio

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Over 500,000 gallons in successful operation for more than 3 years.

After ten years of research and development, and more than 3 years of production experience, The Harshaw Chemical Company offers a new nickel process answering a major problem of the electroplating industry. You can now deposit *economically* a nickel coating that has high leveling, full brightness, excellent ductility, and most important, superior corrosion resistance. *Only the Harshaw Perflow-Perglow Duplex Nickel Plating Process can provide all of the above characteristics.*

Excellent Corrosion Protection Through Use of a Sulfur-Free Deposit
Years of research work performed by The Harshaw Chemical Company revealed that for satisfactory corrosion resistance the nickel deposit must be *sulfur free.* This fact lead to the development of the Perflow nickel plating process. Further research revealed that the utilization of the sulfur-free deposit as a base coating, following by a bright nickel from a compatable bath, would further improve corrosion resistance. Performance data from a number of leading car manufacturers indicate that the Harshaw Perflow-Perglow Duplex nickel plate is comparable to, and frequently better than, buffed grey nickel, and is unequalled by any bright nickel.

Exceptionally High Plating Speeds
With air agitation, high current densities can be employed, resulting in exceptionally high plating speeds.

Excellent Chrome Coverage
The Harshaw Perflow-Perglow Duplex Nickel Plate is easily chrome plated with no unusual treatment of the nickel necessary even over extended periods of time.

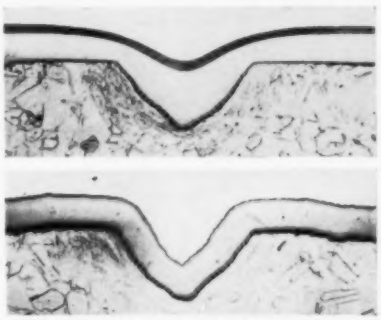
Excellent Leveling
The Perflow-Perglow Duplex Nickel has excellent leveling characteristics which aid in producing bright deposits on poorly polished steel or over dull copper plate. The leveling characteristics can be maintained without sacrificing ductility, brightness, and corrosion resistance.

Outstanding Brightness
Full, bright deposits over a wide range of operating conditions. Even intricate deeply-recessed articles have uniform brightness without shading.

High Tolerance to Impurities
The Perflow-Perglow process has a high tolerance to impurities from the standpoint of both corrosion resistance and overall quality of plate.

Excellent Adhesion
Plating nickel over nickel is no longer a problem. Current can be interrupted without affecting the adhesion. Work can be removed from the plating solution for inspection and put back in the bath without affecting adhesion.

Excellent Ductility at Full Brightness! The ductility of the Perflow-Perglow Duplex Plate is comparable to that of a plate from a Watts nickel bath.



The above photomicrographs demonstrate the leveling effect of Harshaw Duplex Nickel as compared to that of conventional grey nickel.

Top: *Perflow-Perglow Duplex Nickel—depth of scratch 2.7 mils.*

Bottom: *Grey nickel—depth of scratch 2.7 mils.*

MANY OTHER ADVANTAGES!
simplified control . . . stable over extended periods of operation . . . controlled stress . . . uniform protective and decorative plate on both steel and zinc die castings.

HARSHAW'S RESEARCH AND DEVELOPMENT LABORATORY SOLVED THE PROBLEM OF PLATING NICKEL ON NICKEL. THIS COUPLED WITH THE USE OF A SULFUR-FREE NICKEL PLATE HAS MADE POSSIBLE A CORROSION RESISTANT DEPOSIT THAT IS UNEQUALED.

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ROHCO

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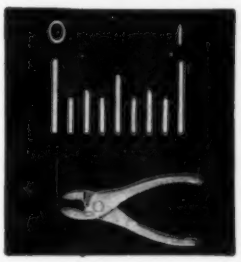

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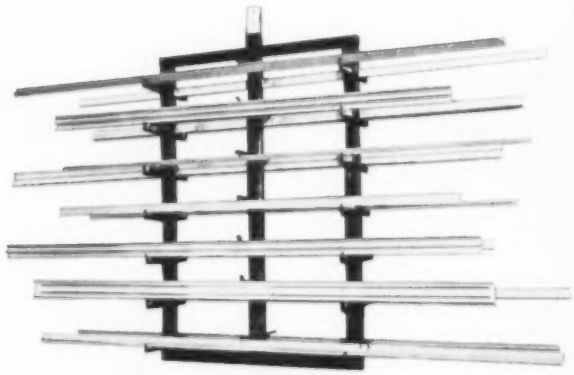

Substantial savings are now possible with these durable, corrosion-resistant anodizing racks, titanium-tipped at slight extra cost, and custom made to your specifications. These same racks were featured recently in the editorial pages of several national trade publications.

Photo above shows one model rack before plastisol coating. Titanium tips, though constituting a small percentage of the total rack area, extend service life of the rack considerably. One user, in three months, saved nine times the additional cost of the titanium tips, by completely eliminating the need for repairs during that period.

Write today for complete information on Davies titanium-tipped anodizing racks and ENGINEERED racks for all types of plating

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Introducing Allied's

IRILAC™ #1000

New Clear Protective Coating for All Metals . . . as safe and easy to handle as Water!

New method of protection incorporates corrosion inhibitors in a water-soluble polymer base. Dries to an extremely thin, tough, durable coating—clear in color. Does not chemically affect base metal or any post-treatments. Used as a protective treatment alone or to enhance value of post-treatments.

Allied's new Irilac #1000 is a concentrated solution of a water-soluble polymer with built-in complex corrosion inhibiting materials. It was developed to answer the needs of the metalworking industry for a non-conversion process that will provide corrosion resistance and resistance to fingerprinting and abrasion on base metals and electrochemically or chemically finished surfaces—without changing the appearance of the metallic surface.

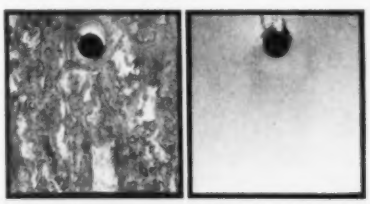
There are no hazards involved—Irilac is non-fuming, non-toxic, and requires no special fire prevention measures.

THE PROCESS

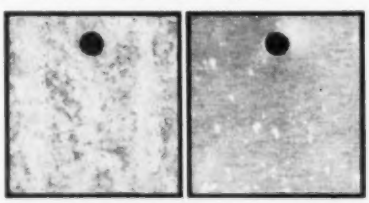
Irilac #1000 is diluted with water to provide a simple one-pass working solution. It is then applied by dip, brush or spray and forms a coating that quickly *bonds* to the metal surface without reacting with the surface.

THE PROPERTIES

The resulting coating is clear, transparent, thin yet durable. It has excellent water-resistant properties, and can be rubbed, handled and subjected to rough treatment. The surface to which Irilac has been applied is not altered—in fact, the transparent coating brings full tone to colored surfaces and clarity to iridescent surfaces. The water-thin physical characteristic of the solution means that the coating provides protection in recessed areas that are difficult, if not impossible, to protect with other methods.



STEEL PANELS: bare (left) and coated with Irilac (right) after 8-hour salt spray.



ALUMINUM PANELS: bare (left) and coated with Irilac (right) after 168-hour salt spray.

WHERE IRILAC CAN BE USED

Irilac #1000 can be applied to *any* metal—wet or dry—treated or untreated. All metals can be processed in *one* operation in the same solution. It can be applied in conjunction with any process—over Iridite, anodized, phosphated surfaces, black oxide, etc. Surfaces treated with Irilac provide a good base for paint.

APPLICATION ADVANTAGES

No other process or material available for the protection of metals offers all the application advantages found in new Irilac #1000:

1. It can be applied to *any* clean metal simply by dip, brush or spray. No special equipment is required.
2. Saves time—just apply and dry—no reaction time required.
3. No hazards involved—no exhaust or special fire protection equipment is required. Irilac is non-fuming and non-toxic.
4. Saves space. Presents no disposal problem. Low in first and final costs.

Because of its versatility and complete safety, Irilac has unlimited uses. For example, it will protect aluminum furniture, brass hardware and fixtures, steel parts of all types, zinc castings, etc. In fact, any base metal or plated surface, or those treated with electrolytic or chemical post-treatments, can be improved or enhanced with Irilac.

IRILAC #1000 MAY BE THE ANSWER TO YOUR PROTECTION PROBLEM

Our development staff will be glad to work with you to determine the significant benefits Irilac can offer you. Simply send us some parts and let us show you what Irilac can do. No obligation, of course.

Allied Research Products, Inc.

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BALTIMORE 5, MARYLAND

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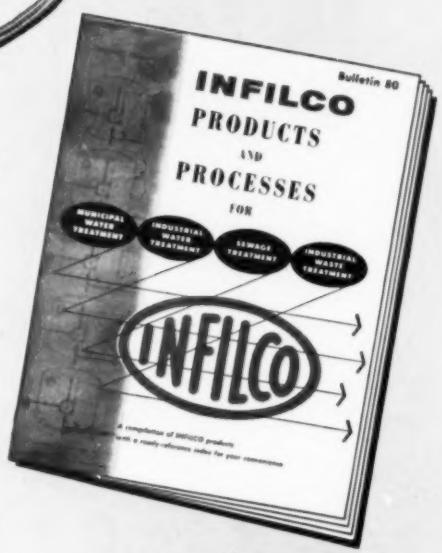

INFILCO announces a NEW CATALOG, to help you select equipment for your water and waste treatment applications.

Cross-indexed for quick, easy reference to equipment, trade names and applications, this 32-page catalog covers all major equipment in the complete INFILCO line. It provides a source of valuable information for you and your engineers.

Write for Bulletin 80, or contact our nearest field office.

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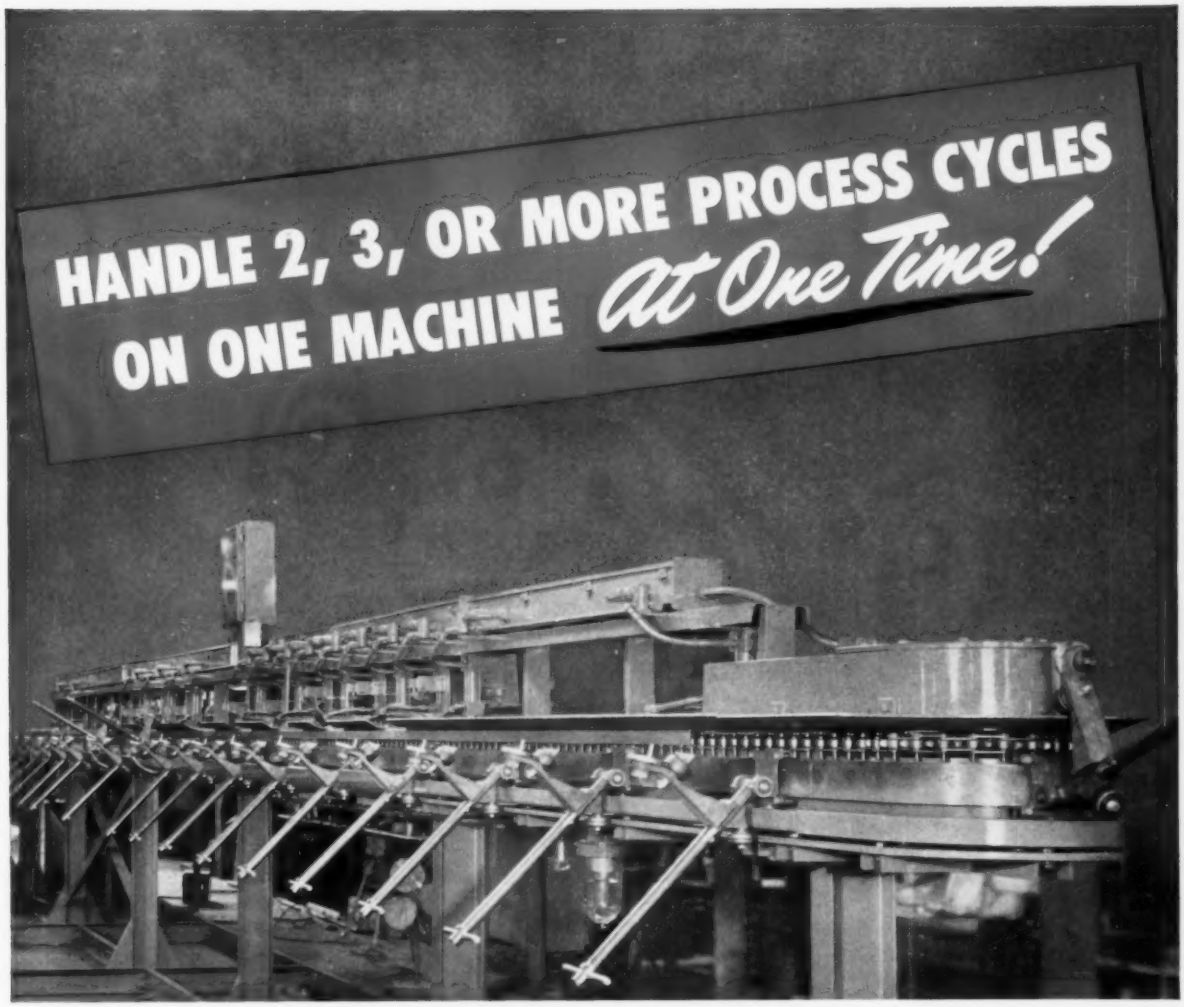

LASALCO'S *Select-O-Matic*

MULTIPLE PROCESS PLATER

Another Lasalco development that offers the industry the last word in *fully automatic* plating!

With the new Select-O-Matic, the operator simply selects the desired process cycle for individual racks, when loading the machine, merely by turning a dial on the carrier. From that point, the rack *automatically* travels through the entire selected cycle without further attention.

A single Select-O-Matic plater, manned by one operator, will handle several various processes simultaneously. Different machines for each process are eliminated—original investment in equipment is greatly reduced—much less floor space is needed—maintenance is cut to an absolute minimum.

The Select-O-Matic is easily adaptable to any operation. Tell Lasalco about *your* operation and requirements to learn what this new machine can do for *your* production and profits.

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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 511.

Look to Wyandotte for the

ETCHING

MIL-ETCH – Etches rapidly at low concentrations; gives uniform, fine-grained etch. No scale or sludge. Long life, simple control, no excessive foam or fumes, nondusty to handle.

CLEANING

ALTREX* – Nonetching, heavy-duty soak cleaner with long life, high detergency. Excellent for cleaning before anodizing, chemical film treatment, or preparation for spot welding.

SPRAY-ALTREX – Spray cleans without etching, has new low-foaming detergents. Easy to control, it works well in all kinds of water.

WYANDOTTE 468 – Neutral, solvent-type cleaner. Miscible with either hydrocarbon solvents or water. Removes oil, buffing compounds, drawing compounds without etching.

DESMUTTING

WYANDOTTE 2487 – Brightens aluminum alloys that darken in alkaline etching processes. Safer than acids; permits close control of desmutting bath. Easy-to-handle granular form; makes solutions of long life.

BRIGHTENING

I-2767-C – For brush or spray application; used as received or diluted with water. Brightens aircraft, truck trailers, aluminum equipment uniformly, rapidly without corroding surface.

PHOS-IT* – Liquid, phosphoric-acid-type product. Removes heavy corrosion quickly, brightens at the same time. Used diluted with water. For brush or dip application. Has high detergency, rapid action, low use-cost.

BARREL FINISHING

ALTREX – For deburring and radiusing with stones or chips. Offers excellent cutting qualities and economy.

BURNEK* 22 – For ball burnishing. Provides real economy for short and medium runs.

DEOXIDIZING

WYANDOTTE 2487 – Provides excellent preparation for spot welding. Gives uniformly low contact resistance on practically all alloys. No heat or close temperature control necessary. No appreciable surface etching. Work can be stored up to 96 hours before welding. Simple control.

best in products for

PAINT PREPARATION

PRE-FOS* – Cleans and prepares all alloys for paint. Adaptable to spray-washer or soak-tank use. Surface is uniformly conditioned to provide superior paint adhesion and corrosion resistance.

PHOS-IT – Excellent for wipe-on, wipe-off cleaning and paint preparation. Gives fine etch or "paint tooth," which results in an excellent paint bond.

Dependable Wyandotte products give you better results, shorten maintenance time, reduce operating costs. Send for free technical literature on the Wyandotte products designed to fit your aluminum-finishing operations. Or call in a Wyandotte representative, today. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

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See you in Cincinnati—A.E.S. Convention
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PAINT STRIPPING

P-1075 – Fast-acting, nonflammable, room-temperature liquid paint stripper with a water seal. Removes most paint finishes without attacking aluminum. Economical – gives extra-long service life.

444-C – Removes paint from large parts or objects quickly. A thickened product for brush or flow-on stripping. Penetrates multiple coats of finishing materials with one application; is nonflammable, water rinsable.

SUPERSOLVE – Removes hard-to-handle enamels and other finishes quickly, without attacking metal. Used hot, diluted with water. Rinses easily.

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- ☐ Brightening
- ☐ Barrel Finishing
- ☐ Deoxidizing
- ☐ Paint Preparation
- ☐ Paint Stripping

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PUT your products in the barrel TAKE your profits out

A great way to save money is to barrel finish metal parts by the hundred instead of manually finishing one part at a time.

Next time a job of grinding, deburring or buffing proves too costly on a wheel, try it in a barrel. The results are often so surprising that barrel finishing becomes an exciting and profitable game.

One Oakite customer changed to barrel methods to deburr curved stainless steel strips that are 14 inches long. The cost for deburring 20,000 strips was reduced from $3,000 to $125.

FREE For a copy of *"Precision Barrel Finishing"* write to Oakite Products, Inc., 40 Rector St., New York 6, N. Y.

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AND
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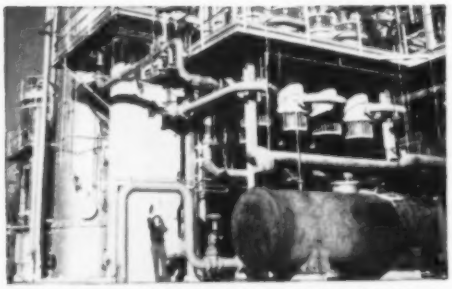
DU PONT PRODUCT NEWS

REG. U. S. PAT. OFF.

NEW HIGH-PURITY SPECIFICATIONS

Du Pont Cyanobrik® now guaranteed 97% minimum sodium cyanide



Du Pont's centrally located plant at Memphis, Tenn., produces the highest-purity sodium cyanide available for your plating operation.

"Cyanobrik" is shipped in easy-to-open, reclosable 100-200-lb. net steel drums. Full-open head makes for easier handling.

Made in the form of 1-ounce pillow-shaped briquettes, "Cyanobrik" is easy to handle, dusting is minimized, and accidental spillage can be cleaned up quickly and safely.

New Du Pont specifications for "Cyanobrik" sodium cyanide guarantee a higher minimum cyanide content, which can result in a lower net cost for your active cyanide. It also automatically lowers the maximum permissible impurities. To the plater this means that Du Pont is guaranteeing a full extra pound of active cyanide per 100 lbs. of "Cyanobrik."

These new specifications are made possible by the up-to-date production techniques used at Du Pont's modern plant in Memphis, Tennessee.

sodium cyanide	**97% minimum**
sodium chloride	**0.2% maximum**
sulfides (as sulphur)	**0.0005 maximum**

You can count on the uniform high quality of "Cyanobrik" for even the most critical plating jobs. The negligible sulfide content makes "Cyanobrik" particularly suitable for use in sulfide-sensitive electrolytes such as proprietary bright-copper baths.

Du Pont's long experience in cyanide electroplating is also available to help you produce better results. Just contact your distributor of Du Pont plating chemicals or write to Du Pont.

A new high-speed cyanide copper-plating process

is available from Du Pont for plating steel parts and zinc die castings. Thoroughly field-tested, it's already being used for automobile bumpers and grilles, hardware products and wire. Advantages: low maintenance cost, only two addition agents needed, consistent and easily controlled performance. Contact your nearest Du Pont district office for full information.

DISTRICT AND SALES OFFICES:

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BOSTON 10, 140 Federal St.

CHARLOTTE 1, 427 W. Fourth St.

CHICAGO 46, 7250 N. Cicero Ave., Lincolnwood

CINCINNATI 2, 2412 Carew Tower

CLEVELAND 20, 11900 Shaker Blvd.

DETROIT 35, 13000 W. Seven Mile Rd.

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NEW YORK 1, 350 Fifth Ave.

PHILADELPHIA 308 E. Lancaster Ave., Wynnewood

SAN FRANCISCO 4, 111 Sutter St.

*Barada & Page, Inc.

Export Division, Du Pont Building, Wilmington 98, Delaware.

FOR MODERN METAL PLATING

Save time, avoid errors in bath make-up and replenishment with Du Pont's new sodium-copper cyanide double salt

Sodium-copper cyanide double salt has been developed by Du Pont to give copper platers a fast-dissolving, tailor-made plating chemical. It's a white, crystalline salt that combines high-quality Du Pont Cyanobrik® sodium cyanide and copper cyanide into *one* convenient copper-plating chemical for both bath make-up and replenishment.

You'll find these advantages in this new, easy to use sodium-copper cyanide double salt:

Time Saved—This convenient plating chemical eliminates time spent in weighing out sodium cyanide and copper cyanide separately. It dissolves readily in water or plating solution without the evolution of heat . . . cutting out several steps required to dissolve copper cyanide properly.

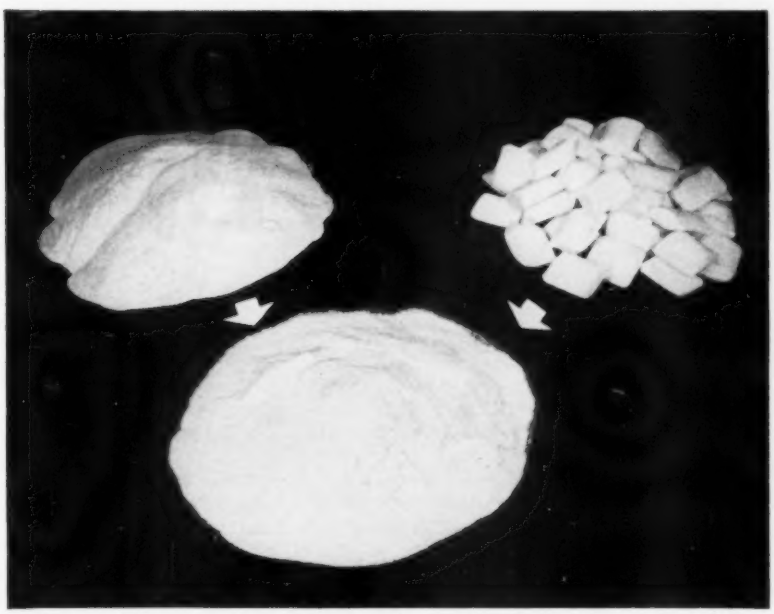
Errors Avoided—The active ingredients—sodium cyanide and copper cyanide—are present in the proportions required in the bath. This makes preparing or replenishing the plating bath a simple operation.

Chemical Handling Reduced—Sodium-copper cyanide double salt's balanced composition cuts down the handling of chemicals giving you an added safety measure.

High Purity—Extremely pure basic constituents, careful manufacturing techniques, and low lead and sulfide contents give you a high-quality copper-plating product.

Double salt is prepared by crystallization from a filtered solution of Du Pont "Cyanobrik" sodium cyanide and Copper Cyanide. And new double salt contains no added materials such as sodium sulfocyanide.

Double salt is shipped in convenient, moisture-resistant 100-lb.-net fiber containers. For more information on this high-quality copper-plating salt, including information on price and delivery, call your Du Pont distributor or write today to your nearest Du Pont district or sales office.



• The same high quality that you have found in Du Pont Copper Cyanide (rear left) and "Cyanobrik" sodium cyanide (rear right) is combined into new, timesaving sodium-copper cyanide double salt (foreground).

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

ELECTROCHEMICALS DEPARTMENT
Sodium Products Division

E. I. DU PONT DE NEMOURS & CO. (INC.)
Wilmington 98, Delaware

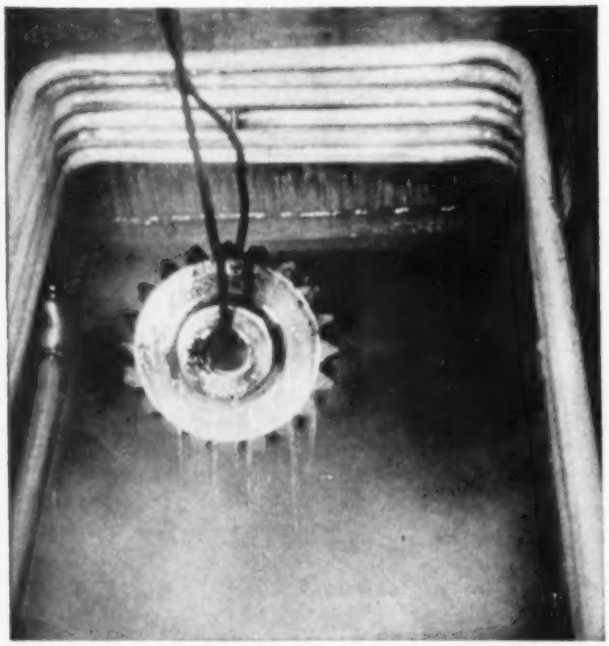
DU PONT REG. U. S. PAT. OFF. *PRODUCT NEWS*

Vapor degreasing offers you a simple, economical way to clean metal

Here are the facts . . .

People who are not familiar with vapor degreasing often think of it as a complicated and costly process. Actually, it is simple, fast, effective and economical. Here's how the process works:

Vapor Degreasing Is Simple—A vapor degreaser is essentially a metal tank of the proper size to handle the parts to be cleaned. Trichlorethylene, a non-flammable solvent for all types of oily and greasy contaminants, is heated in the bottom of the tank to its boiling point of 188°F., causing hot vapors of the pure solvent to fill the space above the liquid. Height of the vapor zone is set by cooling coils around the inside of the tank wall near the top. Here the vapors are condensed, and the liquid condensate is returned to the tank for re-use. Because the vapors are 4.5 times as heavy as air, they do not mix readily with the air above the tank.



• A dirty part is lowered into the vapor zone where condensing vapors dissolve and flush away the soil—leaving the part completely clean and dry.

Vapor Degreasing Is Thorough—Cleaning takes place when soiled metal parts are suspended in the hot vapors. The vapors instantly begin condensing on the cooler surfaces of the parts, dissolving and flushing away all soluble soils. The vapors can easily penetrate seams and recesses, so cleaning action is thorough, even on the most complicated shapes. For parts with stubborn soils or extra-heavy contamination, warm solvent sprays or liquid immersion steps can augment the cleaning action of the vapors. Since the final cleaning step in any vapor degreaser is a rinse in pure trichlorethylene vapors, re-soiling of the work is never a problem. Parts leave the degreaser thoroughly clean and dry . . . in minutes!

Vapor Degreasing Is Economical! Superior cleaning action virtually eliminates the problem of rejects. Parts come out dry; no need for a costly investment in drying equipment. Equipment is compact . . . saves floor space and fits smoothly into production-line operations. Modern equipment design provides better solvent mileage and saves you money while insuring consistently high cleaning quality.

Get the complete story on vapor degreasing! Send coupon today for free comprehensive booklet, or contact your nearby distributor of "Triclene" D trichlorethylene.

DISTRIBUTORS MEET TO HELP SERVE YOU BETTER

Distributors of "Triclene" D recently attended a series of meetings, held by Du Pont, where vapor degreasing techniques and equipment design were demonstrated. Heart of the meetings was a discussion of Du Pont's new Cost-Analysis Service and the customer service available from the new Du Pont Sales Technical Laboratory. These meetings were designed to enable your distributor to serve you better and help keep your operation efficient. Your "Triclene" D distributor will be pleased to discuss these new services with you. Just give him a call.

DU PONT REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

FOR MODERN METAL CLEANING

New Du Pont Cost-Analysis Booklet now ready to help you:

Reduce present metal-cleaning costs . . . Choose the best cleaning method for your expansion or new installation

The details of Du Pont's new Cost-Analysis Service have just been compiled in booklet form. Copies are now in the hands of your distributor of "Triclene" D trichlorethylene.

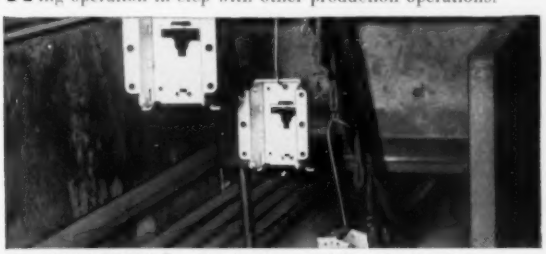
With this Cost-Analysis Booklet your "Triclene" D trichlorethylene distributor, working with the local Du Pont Solvents Technical Representative, can help you determine the true cost of your metal-cleaning operations, spot items that are out of line and show you where and how *your present metal-cleaning costs may be reduced.* If you're planning *a new installation* or expanding your operation, the booklet can be used to help you select the most *economical* and *efficient* cleaning process.

This new booklet describes a step-by-step method of preparing a complete cost analysis. It also provides blank sheets for making cost studies and information on each of the individual cost items to simplify the job of preparing an objective cost comparison. A sample analysis of competitive cleaning methods is included as a guide.

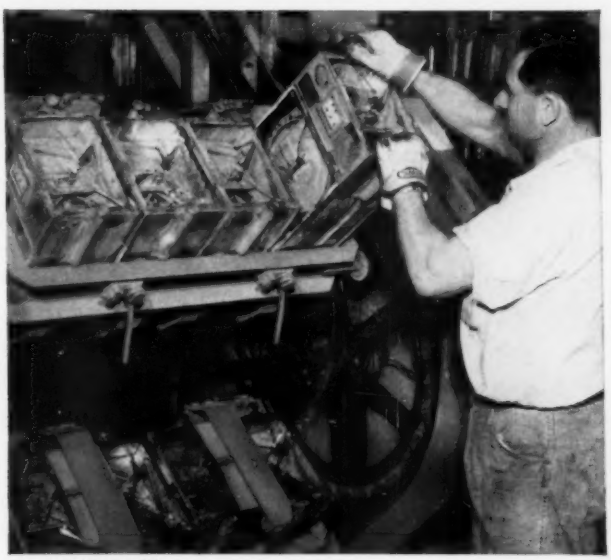
Mail coupon below or ask your distributor of "Triclene" D to show you Du Pont's new Cost-Analysis Service.

Here's the kind of superior cleaning you get with TRICLENE® D

1 FAST! Grease-covered switch-gear housings are shown entering the degreasing unit. Conveyorized degreaser keeps cleaning operation in step with other production operations.



2 THOROUGH! Completely clean and dry, the housings emerge from the degreaser ready for inspection, assembly or further processing.



3 EFFICIENT! These gas meter cases being removed from conveyorized degreaser were cleaned effectively in one fast operation. Vapor degreasing is ideal for tough cleaning jobs, difficult soils, intricate parts.

Backed by Du Pont's long experience, "Triclene" D's unique stabilizer formulation stands up against all degreasing stresses, assures brighter cleaning, makes cleanouts easier and less frequent.

ELECTROCHEMICALS DEPARTMENT
Chlorine Products Division

E. I. DU PONT DE NEMOURS & CO. (INC.)
Wilmington 98, Delaware

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept. P-5, Wilmington 98, Del.

☐ Please send me your booklet on vapor degreasing. ☐ I want information on Cost-Analysis. ☐ Have representative call.

*Name*_____ *Position*_____

*Present method of cleaning*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

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Everything for Plating and Polishing

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for polishing
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parts having contoured
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Longer life—
More parts buffed with
less compound
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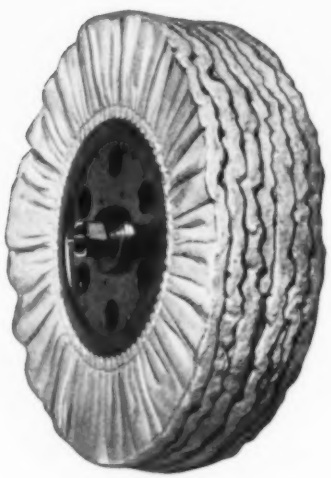
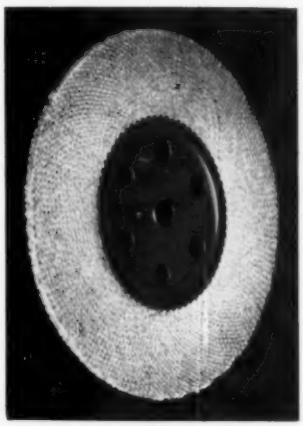
cooler operating
Pre-tested, accurately
balanced & ready faced
For added safety—one
row of extra heavy
concentric sewing close
to center plate





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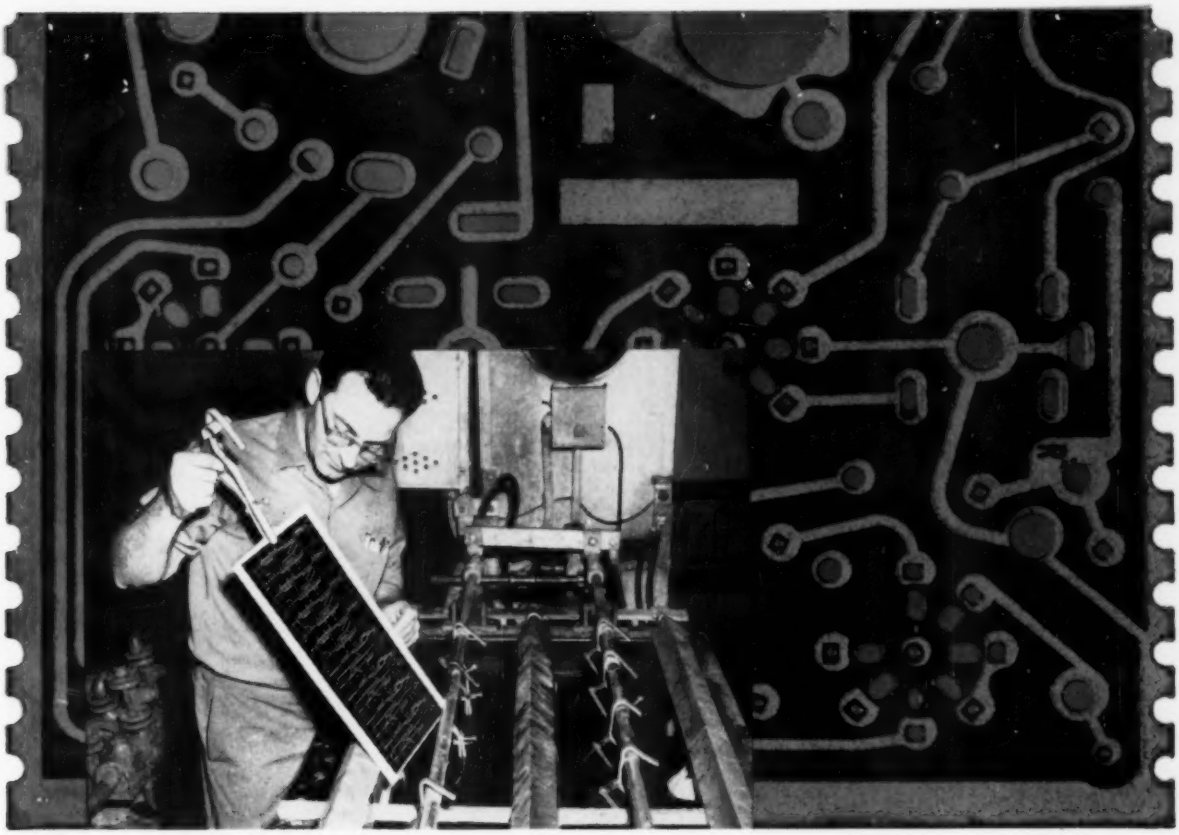

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FASTER, BETTER, AT LOWER COST

...with B&A Fluoborates

First step—use B&A copper fluoborate for high-speed copper plating of thick, high quality circuits.

Second step—use B&A lead-tin fluoborate for maximum solderability (60:40 tin-lead deposit).

Advantages: Both of these high purity fluoborate plating solutions come in concentrated solution form. They give you easy bath make-up and easy control. Since anode and cathode efficiencies approximate 100%, you get easy maintenance, too. They require no mixing or dissolving, and offer excellent bath stability, good anode corrosion.

BAKER & ADAMSON® Fine Chemicals

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

Result: You produce *better* printed circuits, *faster* and *at lower cost—more easily*, too!

Mail coupon now for comprehensive technical bulletins giving complete information on these improved plating techniques for printed circuits.

B&A

BAKER & ADAMSON® Fine Chemicals
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40 Rector Street, New York 6, N. Y.

Please send technical bulletins on the use of B&A Fluoborates in the production of printed circuits.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____ PL-58

VANTON *notes on fluid handling*

PUMPS · PIPE · FITTINGS · VALVES

High-Temperature Polyethylene Increases Sealless Pump Application Range

Marlex 50 Polyethylene*, the latest plastic material adapted for use in the Vanton Pump, is a new material with wide corrosion-resistant properties, which withstands temperatures up to 260°F.

Characterized by a close, dense molecular structure and a long molecular chain length, Marlex possesses a high tensile strength, low permeability, excellent impact strength, and a high degree of crystallinity. Whereas conventional polyethylene is limited to services under 140°F., the new Marlex 50 Polyethylene can handle extremely corrosive fluids at temperatures up to 260°F., enabling it to withstand sterilization and boiling without damage.

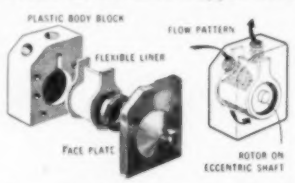
These desirable characteristics expand the application of the Vanton plastic pump line to a broad range of corrosive fluids, abrasives, slurries, and other solutions which must be pumped without contamination at elevated temperatures.

The new Marlex 50 Vanton Pump, like all other Vanton self-priming pumps, is available in a wide variety of interchangeable plastic body blocks, and rubber or synthetic flex-i-liners; and in capacities of ⅓-40 GPM. For more information, circle #512 on coupon below.

*Reg. trade mark of Phillips Petroleum Corp.

Vanton Design Eliminates Stuffing Boxes, Shaft Seals

Basic Vanton design avoids the problems associated with stuffing boxes and shaft seals by eliminating the seals themselves! All fluid moves in a channel formed between molded plastic body and synthetic interliner. No liquid touches metal. Pumping mechanism is rotor, inside the liner, mounted on eccentric shaft. At each revolution it creates a progressive squeegee action on the fluid trapped between the liner and the housing. Available in a variety of plastic materials, including Teflon* and Kel-F Elastomer**. For further information, circle 511 on coupon and mail to Vanton. Or, for a demonstration of this unusual motor-pump unit, see your nearest dealer.



*Reg. Trade mark of E. I. DuPont.
**Reg. Trade mark of Minn. Mining & Mfg. Co.

Vanton Pump & Equipment Corp.
Hillside, N. J.

Please send booklet circled: **511** **512**

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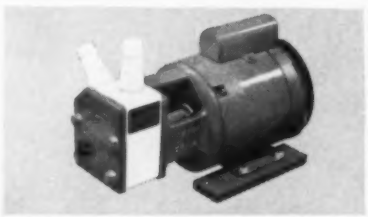
Teflon* Sealless Pump Now Available In Close-Coupled All-Purpose Portable Motor-Pump Unit



Portable Vanton Motor-Pump Unit, with convenient handle and platform, in variety of plastic constructions, has wide application for general utility, standby, and process applications

No-Shaft-Seal Principle Eliminates Leakage and Corrosion, Minimizes Maintenance for Wide Range of Pumping Problems

Here at last is a portable all-purpose motor-pump unit to handle *all* your ⅓-10GPM pumping problems! This pump's unusual no-stuffing-box design eliminates leakage, corrosion, and contamination, and minimizes maintenance. Provided with a convenient handle, and mounted solidly on a platform, this unit will find wide use in pumping all kinds of corrosive, abrasive, pharmaceutical, and plain ordinary industrial fluids encountered in plant operations.

This brand-new motor-pump model is an adaptation of the unique Vanton Plastic Pump that has been performing so outstandingly under the most difficult pumping situations to be found in the chemical industry today. Vanton has taken the basic design principle of this pump (NO STUFFING BOX OR SHAFT SEALS) and by skillful engineering has produced a portable motor-pump unit that for versatility, convenience, and corrosion and abrasion resistance has no equal on the market today.

PUMP PERFORMANCE DATA[1]

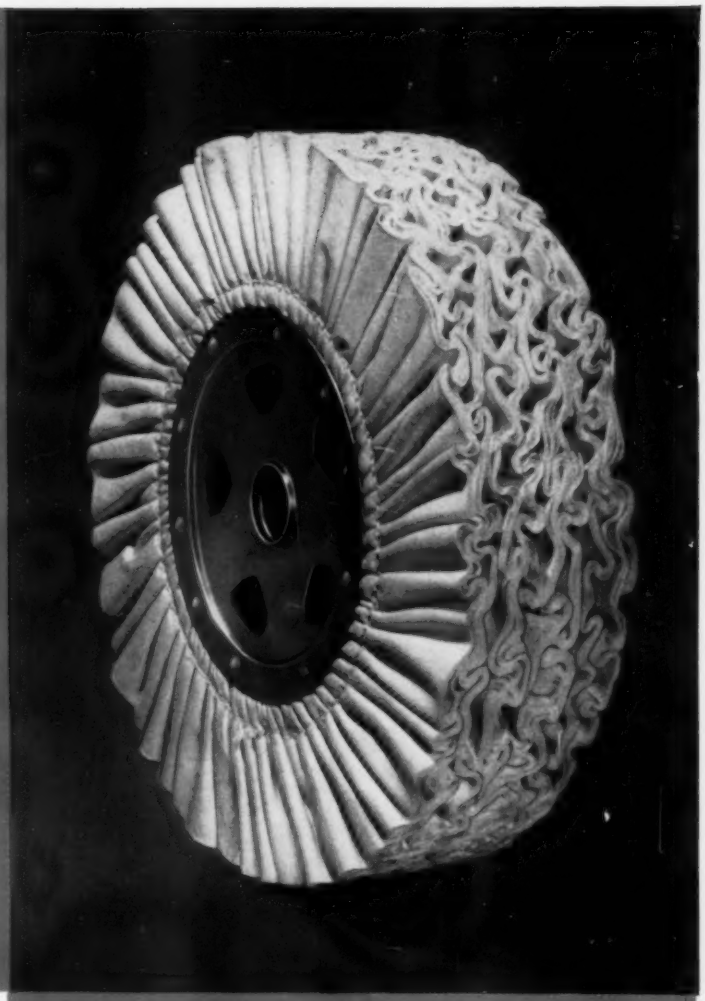
MODEL NO.	CAPACITY Gals./Min.[2]	OPERATING PRESSURE RANGE Lbs./sq. in. gauge	
		INTERMITTENT	CONTINUOUS
2	0.33	0-20	0-10
6	1.0	0-25	0-15
12	2.0	0-30	0-25
18	3.0	0-35	0-30
30	5.0	0-45	0-30
60A	10.0	0-40	0-30

[1]1750 rpm, ¼ H.P. all models, except 60A (½ H.P.) [2]Water at 70° F., against zero head.

VANTON PUMP
and Equipment Corp. • Hillside, N. J.
DIVISION OF COOPER ALLOY CORP.

WILLIAMSVILLE BUFF DIVISION
EST 1893 A1 ®
DANIELSON CONNECTICUT

NOW for Automatic Buffing



LET THE FAMOUS Williamsville CUTMASTER

- Precision-engineered for perfect balance throughout
- Perforated steel center gives cool running at highest speeds
- Cut on the bias for extra life
- High-count long fibre cotton will not fray or ravel

GIVE YOU LONGER SERVICE ... GREATER PROTECTION!

For over half a century, Williamsville Buffs have boosted production — cut overhead costs — in plants all over the country. Ask us for the answer to your buffing problems now — write, wire or phone!

WILLIAMSVILLE BUFF DIVISION
The Bullard Clark Company

DANIELSON • CONNECTICUT

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 520.

Flexibility

Adaptability

Mobility

that's what you get in an

Acme G4

POLISHING AND BUFFING MACHINE

Easy adaptability to new work assignments—that's the real measure of usefulness for any basic power unit. The Acme G4 polishing and buffing lathe passes this test with no difficulty on any automatic operation.

This versatile lathe readily converts from buffing to polishing. On one job it may be stroking or oscillating, on another it may be stationary. The unit requires no superstructure for support. And it is completely adjustable four ways horizontally on its universal base, and two ways on the vertical column. The head angles to any degree from horizontal to vertical and operates in any position.

The results of this efficiency in the Acme G4 are: (1) more complete and constant high quality automatic finishing of *unusual shapes*, (2) a general reduction in belt, buffing wheel and compound costs, and (3) complete equipment adaptability to next year's product designs.

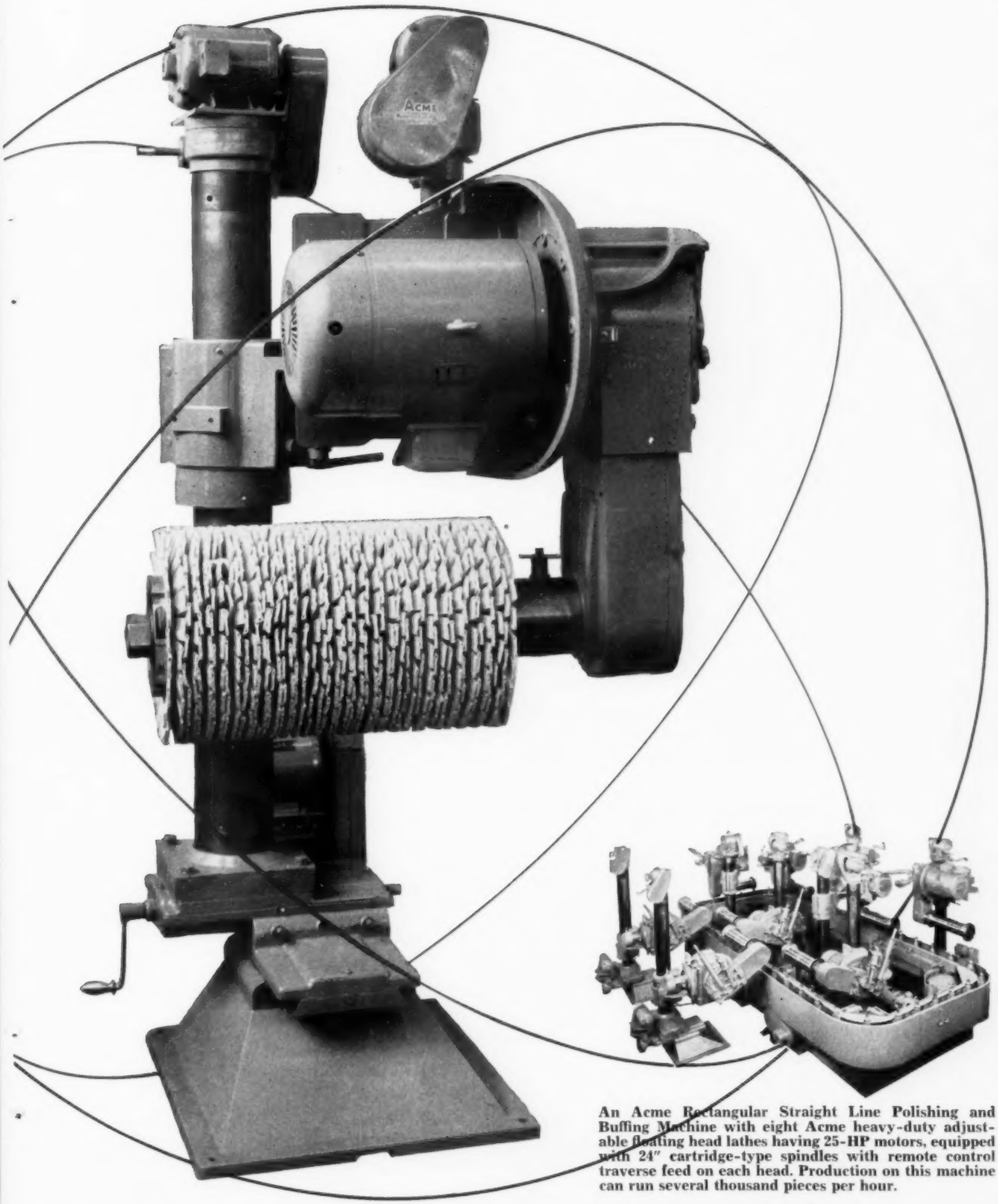
To help you combine these Acme G4 lathes with automatic work-holding or fixturing equipment for high-production, low-cost finishing, Acme offers the services of a highly specialized engineering staff. There's no obligation for this consultation service. Give us a call.

LET ACME *Polish Off* YOUR FINISHING PROBLEMS

ACME MANUFACTURING COMPANY

LEADING PRODUCERS OF PLATING

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 521.



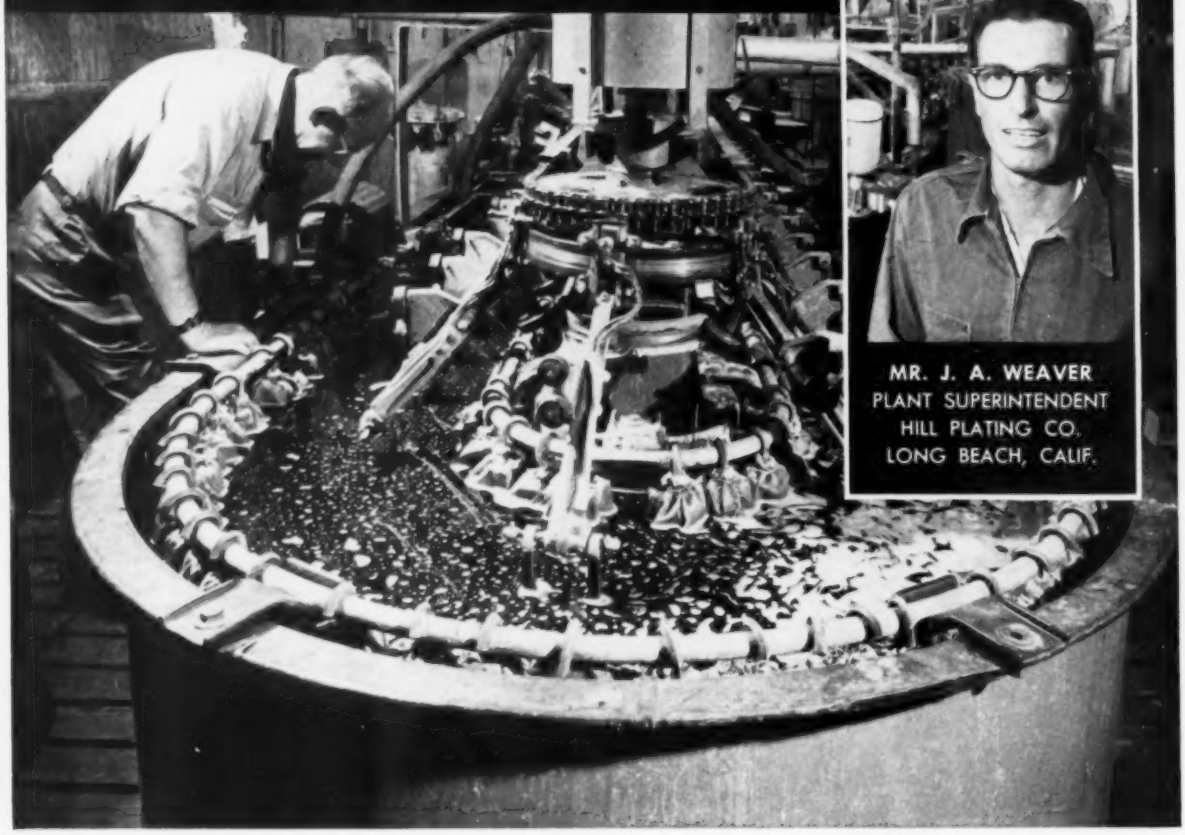
An Acme Rectangular Straight Line Polishing and Buffing Machine with eight Acme heavy-duty adjustable floating head lathes having 25-HP motors, equipped with 24" cartridge-type spindles with remote control traverse feed on each head. Production on this machine can run several thousand pieces per hour.

1400 E. 9 MILE ROAD, DETROIT 20, MICHIGAN

AUTOMATIC POLISHING AND BUFFING EQUIPMENT SINCE 1910

"THIS STEVENS MACHINE LOWERED OUR PLATING COST BY 30%" says

MR. J. A. WEAVER
PLANT SUPERINTENDENT
HILL PLATING CO.
LONG BEACH, CALIF.



"...and *tripled* our man-hour production rate!"

The Hill Plating Company has discovered that their installation of a STEVENS "Little Steve" Automatic Plating Machine, has not only done away with the usual problems of hand line operating . . .

IT HAS ALSO . . .

- Lowered unit costs
- Met all production requirements with ease
- Released workers for other inter-plant tasks
- Saved up to 50% in plating solutions

And, along with these economical developments, the Hill Plating Company is now enjoying the even balance of production and labor that *only* accompanies automatic plating!

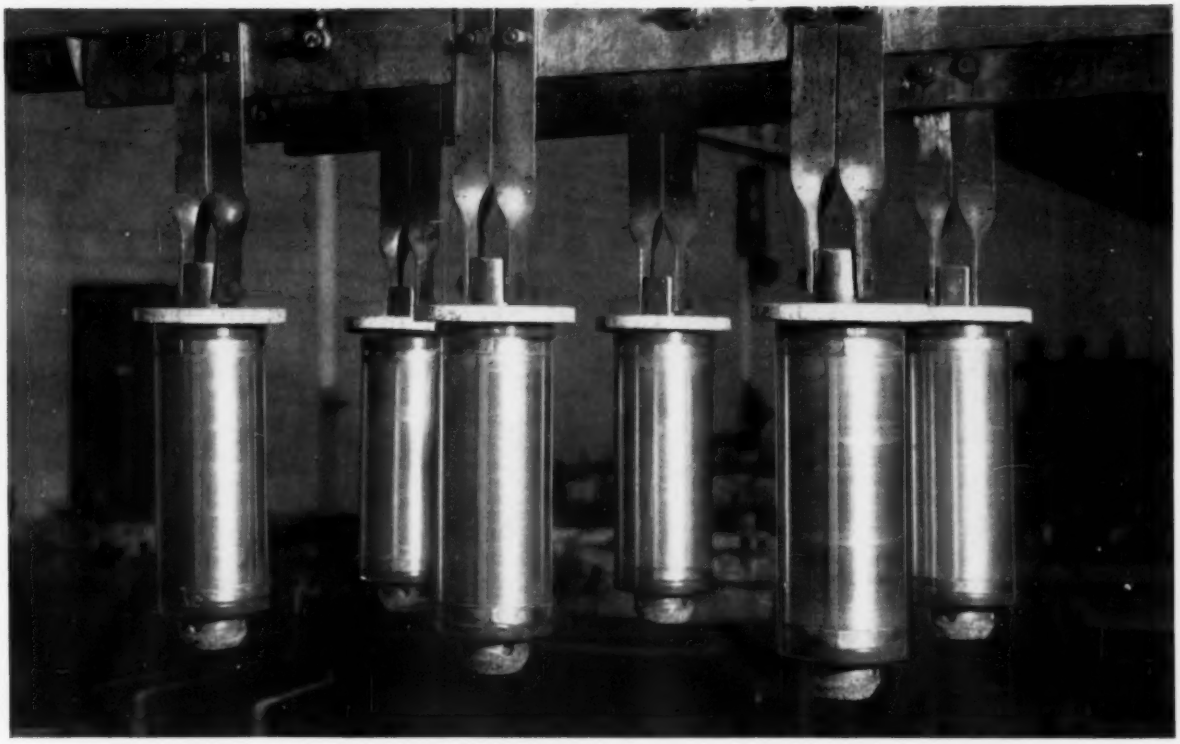
If your present method of plating is keeping your processing costs up, why not let your local STEVENS Sales Representative show you the *profitable* way to increase production!

Remember – When you go automatic . . . go STEVENS!

frederic b. **STEVENS,** inc.

DETROIT 16, MICH.

BUFFALO CHICAGO DETROIT CLEVELAND
DAYTON NEW HAVEN SPRINGFIELD (OHIO)



These six arbors of piston rings have just emerged from a chrome plating bath at the Koppers Company's Baltimore plant. Consistently low sulfate content of Mutual Chromic Acid helps insure flawless finish on critical parts like these.

To insure a uniform, flawless chrome finish use

MUTUAL *LOW SULFATE* CHROMIC ACID

When chrome plating must be perfect – when anything less means a profit-eating reject – you can rely on Mutual Chromic Acid to reinforce your technical skill.

Mutual Chromic Acid is always 99.75% pure – or better. Sulfate content never exceeds 0.1%. This consistently low sulfate content of Mutual Chromic Acid makes it easy for you to control the acid-sulfate ratio of your plating bath. It is your insurance against plating difficulties.

Send today for the free Mutual booklet, "Chromium Chemicals," which contains useful technical information about the entire line of Mutual chromium chemicals. A Technical Service Staff is also available, to offer help or information at any time.

Mutual Chromium Chemicals

MUTUAL

Sodium Bichromate
Sodium Chromate
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Please send me Bulletin #52—Chromium Chemicals—Their History, Properties and Uses.

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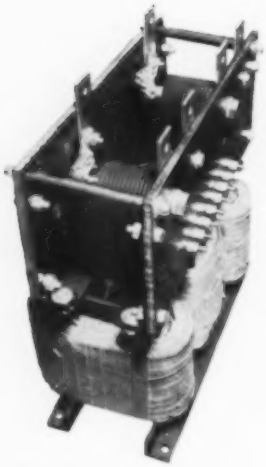
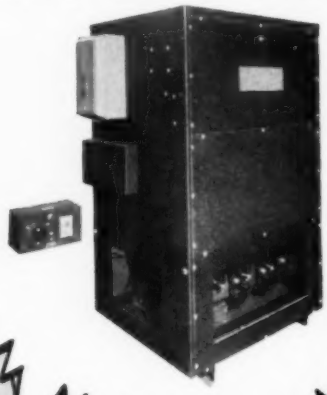


REGAL LINE
MAGNETIC AMPLIFIER REGULATED RECTIFIER

AUTOMATIC VOLTAGE or CURRENT STABILIZATION

At less than tap-switch non-regulated prices!

Rating: 1500 Amp. 10 Volts



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A.E.S. CONVENTION
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HOTEL SHERATON-GIBSON
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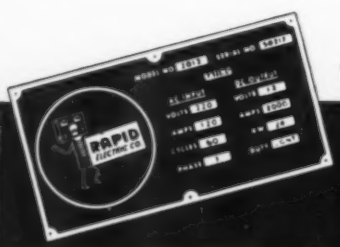

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INDICATE B 501. ➤

LEA and LEA-RONAL for

BURRING • BUFFING • LAPPING • POLISHING • PLATING

SATIN FINISHING • STRIPPING • ANALYZING

INDUSTRY'S SHOPPING CENTER for PLATING and SURFACE FINISHING PRODUCTS and TECHNICAL SERVICE

...Here's your supermarket for industrial abrasive compositions, electrochemical processes, polishing wheel and belt cements, wetting agents, finishing compounds

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Lea-Ronal, Inc., Main Office and Laboratory:
139-20 109th Ave., Jamaica 35, N. Y.
Manufacturing Plant: 237 East Aurora St., Waterbury 20, Conn.

Lea-Ronal INC.

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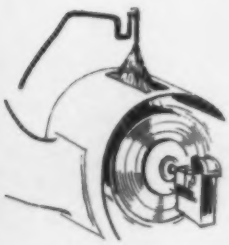
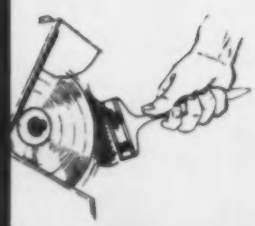
Complete testing and manufacturing facilities to help YOU solve your production line problems in BUFFING · POLISHING · BURRING LAPPING · SATIN FINISHING





LEA COMPOUND . . . industry's pioneering greaseless composition for burring, buffing, satin finishing, and flexible polishing; contains abrasives ranging from sharp, fast-cutting grits to fine, soft powders for delicate finishes.

LEA LIQUABRADE . . . clean-working, fast-cutting and mirror-finishing liquid buffing compound, providing in effect continuous operations and substantial economies in compositions and buffs; clean and safe, non-flammable, non-explosive; many abrasive types and grain sizes for all non-ferrous metals, steel, stainless alloys, and plastics.

LEAROK . . . compositions with "no free grease" designed primarily for buffing or coloring pieces which involve cleaning difficulties; does not pack up in recesses and ornamentations.

LEA GRIPMASTER . . . high bonding strength cement for polishing wheels and belts; used in setting up longer lasting polishing wheels and belts for both ferrous and non-ferrous metals.

AD-LEA-SIVE . . . glue-base adhesive for sizing, buffing and polishing wheels prior to application of Lea Compound, Leabrasive or other loose abrasives; available in bar form or bulk.

LEA LAPPING PASTE . . . micron size controlled abrasive paste for accurate and fine surface finishing.

LEABRAMENT . . . greaseless, non-flammable, quick-drying, liquid abrasive for burring and polishing; can be sprayed or brushed on wheels.

LEA LIQUALUBE . . . water soluble liquid lubricant for polishing wheels and belts; can be sprayed or brushed on.

LEA LUBAR . . . bar form lubricant for polishing wheels and belts where glazing is not a problem.

cLEAn GRAIN LUBAR . . . special bar form lubricant to eliminate glazing on polishing wheels and belts.

LEA COLDSTRIP . . . a room temperature, non-toxic stripper for synthetic enamels; requires minimum ventilation; can be filtered for continuous use.

LEA SYNSTRIP . . . a fast working, non-corroding liquid stripper for enamel, lacquer and synthetic coatings; will not attack base metal or alloy; does not dissolve the coating but breaks the bond. Heating permits alkyd, epoxy, phenolic silicone and urea coatings to be stripped in seconds.

LEATARDENT . . . anti-stain dip emulsion; prevents staining and tarnishing of plated surfaces.

LEA PLASTI-BRADE . . . a flexible liquid abrasive polishing composition carrying the finer grit sizes.

LEA PLASTI-GLUE . . . a flexible liquid adhesive for setting up polishing wheels.

LEA KROMSAVERS . . . inert plastic rods and floating tubes . . . mist preventive for chrome and other plating solutions.

LEA LECTROMAG . . . portable electrical instrument for measuring the thickness of non-magnetic coatings on carbon steel and iron.

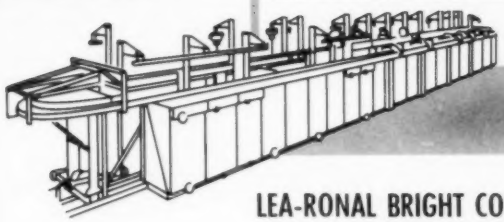
LEA ANALYTICAL METHODS . . . plater's short cut methods for analyzing plating solutions.

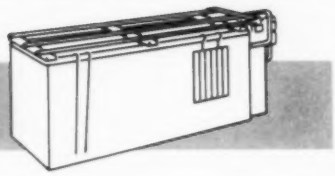
LEA COPPER-GLO . . . . . tolerant to contaminants while consistently producing a high speed, buffable, bright plate.

LEA SPRAY GUN MOVER . . . air-actuated machine for mounting automatic spray gun; sprays liquid buffing compositions uniformly on wide face buffing wheels.

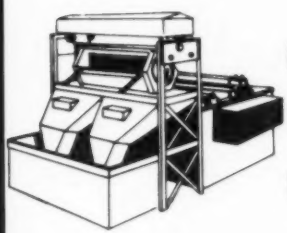
LEA BUFF RAKE AND EVENER . . . a sturdy "two handy tools in one" for raking and evening of buff wheels without tearing the buff face, breaking threads or leaving jagged, rough or uneven surfaces.

Tested BRIGHT PLATING PROCESSES, ADDITIVES and SPECIALTIES developed by electrochemists to exacting standards. Product and Process hand in hand from one source of supply.



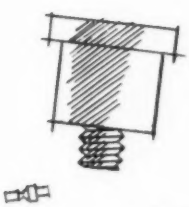


LEA-RONAL BRIGHT COPPER . . . tolerant to contaminants while consistently producing a high speed, buffable, bright plate through the use of Lea Copper-Glo.



LEA-RONAL BRIGHT ACID COPPER using Copper Gleam . . . exceptional leveling action, excellent buffability, exceptionally stable.

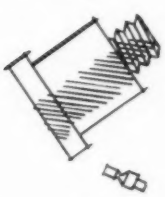
LEA-RONAL CUPROTYPE ACID COPPER . . . an acid-copper Plating Process designed for electroforming and electrotyping. Producing smooth, ductile, tree-free, heavy deposits at high speed.



LEA-RONAL BRIGHT HIGH SPEED BRASS using Brass-Glo . . . uniform, lustrous deposit over a wide current density range.

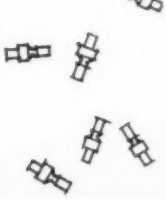
LEA-RONAL BRIGHT NICKEL using Nickel Gleam . . . extremely ductile deposit, exceptional leveling characteristics, high throwing and covering power.

LEA-RONAL BRIGHT SILVER using Silver-Glo . . . industrial or decorative. Rapid deposition, harder deposits, high tarnish resistance.



LEA-RONAL BRIGHT GOLD using Golden-Glo . . . industrial or decorative. Produces a smooth, bright ductile deposit with excellent wear resistance.

LEA-RONAL BRIGHT CADMIUM . . . produces bright protective cadmium electrodeposit for use on both ferrous and non-ferrous metals.



LEA-RONAL BRIGHT ZINC . . . a bright zinc for barrel and still operation. Stable brighteners have long staying power.

SUPERTARTRAL . . . exceptionally effective addition agent for cyanide copper baths, particularly Lea-Ronal baths . . . produces smooth deposits and excellent anode corrosion. Better and more economical than Rochelle Salts.

ULTRATARTRAL . . . superior addition agent for cyanide copper baths permitting exceptionally high current densities, wider range in free cyanide, use of sodium cyanide; tolerant to carbonates, easy to control.

CUPRALL . . . cyanide copper addition agent producing high speed buffable copper deposits where brilliance is not required.

WATERSHED . . . liquid rinse aid which promotes free rinsing and fast drying, hence reduces staining and spotting of plated pieces.

WETTING AGENTS CW-6 and CW-7 . . . addition agents for all cyanide copper plating baths, particularly Lea-Ronal. Benefits anode corrosion; increases tolerance to organic contamination.

TST PURIFIER . . . brings about remarkable increase in tolerance to chromium and zinc in cyanide copper baths, particularly when used in conjunction with Supertartral or Ultratartral.

LEA NICKEL-GLO . . . a "no-sludge" addition agent for barrel nickel plating solutions, producing bright plated surfaces and fine deposits of metal; possible to eliminate burnishing of small articles.

LEA MIRRO-GLO . . . similar to Nickel-Glo in effect but for still tank nickel plating.

RONAL EZ KLEEN FILTER . . . a different type filter operating on a vacuum principle. Crystal clear filtrate, flexible fast cleaning, simple to operate, economical.

See next page

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SERVICE

Our laboratories in Jamaica, New York, Waterbury, Connecticut, and Detroit, Michigan, and our field engineers are always ON CALL. Lea is FINISHING HEADQUARTERS for literally hundreds of manufacturers . . . we would like to tackle your Plating or Finishing Problems. Write or call . . . we're ready to help you cut your costs and get a better finish.

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Main Office and Laboratory:
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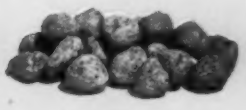
237 East Aurora Street, Waterbury 20, Conn.

Printed in U.S.A.

Now's the time...here's the place

The big Norton Sample Processing Department solves your finishing problems with a wide variety of tumbling equipment . . . and the right abrasive to do the job.

to find the tumbling abrasive you need



ALUNDUM* TUMBLEX* "A" Abrasive. For general barrel finishing. Removes flash, scale, tool marks and burrs, while forming radii and finishes to required micro-inches. Seventeen sizes.

ALUNDUM TUMBLEX "T" Abrasive. Bonded, triangular and fast-cutting for special shaped parts. They won't wedge in work slots or holes. Four sizes.

ALUNDUM TUMBLEX "S" Abrasive. Bonded spheres that get into areas where other shapes can't reach. Exceptionally dense and long lasting. Five sizes.

TUMBLEX "N" Abrasive. Natural stones, exclusively Norton. For high lustre, especially on die castings and soft metal. Rounded shape brings up highest lustre. Seven sizes.

G-341

If you're still finishing metal parts the long, hard way, now's the ideal time to find the fastest, most effective barrel finishing equipment, methods and abrasives.

For example, one leading aircraft parts manufacturer reports saving over $90,000 yearly by shifting from hand-finishing to barrel finishing with Norton TUMBLEX abrasives.

There's one sure way for you, too, to get these cost-cutting, product-improving "Touch of Gold" advantages. Your metal parts can range from tiny needles to hefty forgings . . . may be simple or complicated, hard metals or soft . . . may require deburring, descaling, better color and closer finish. Just send sample parts to our Sample Processing Department. They'll be returned to you completely finished to requirements, with a detailed report. Or, next time you're in our area, drop in and learn how your finishing can be improved.

NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors all around the world.

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ABRASIVES

Making better products... to make your products better

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Refractories

BEHR-MANNING DIVISION
Coated Abrasives • Sharpening Stones
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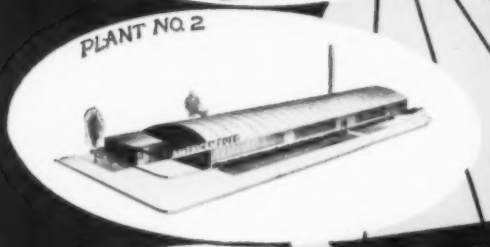
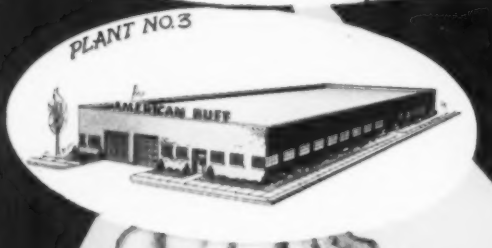
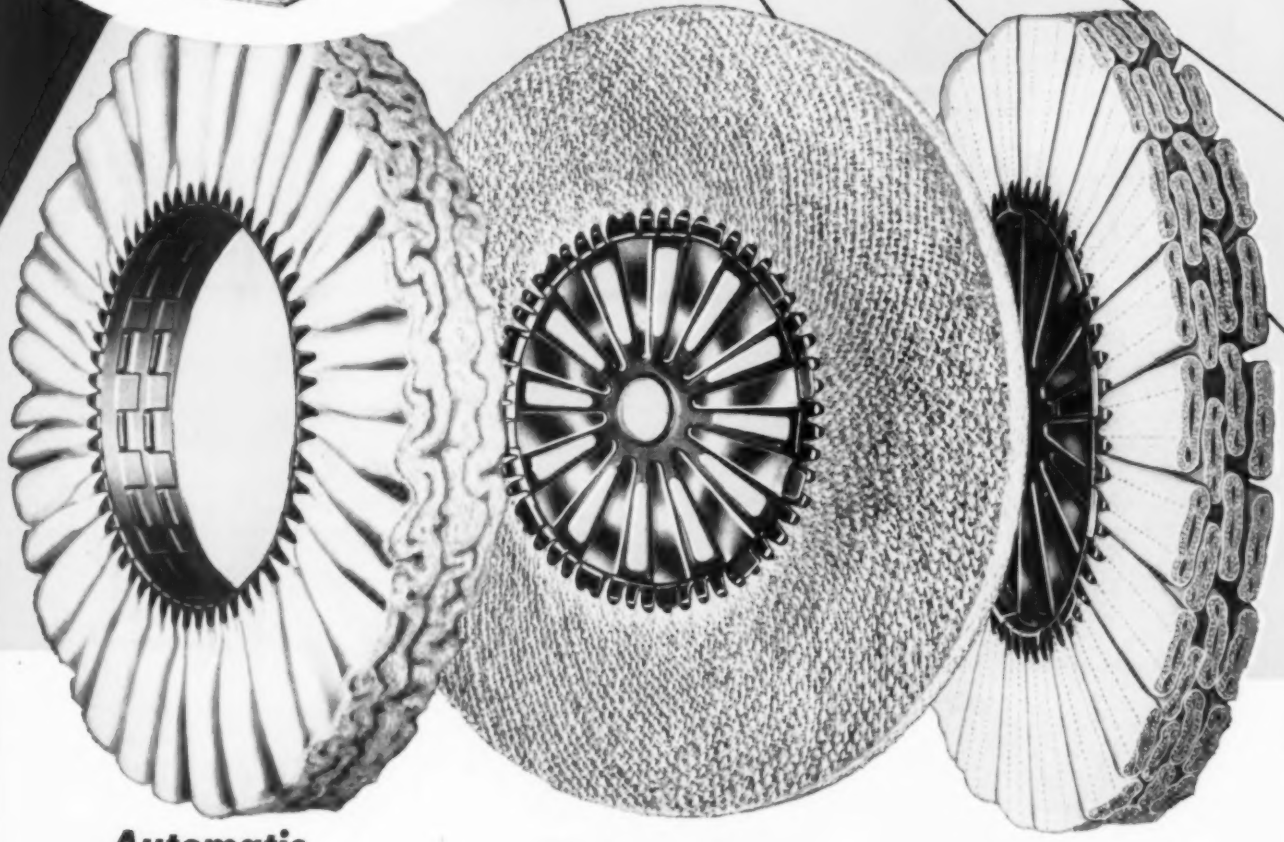




For the

Engineered to do MORE buffing Jobs BETTER!

From the world's largest buff manufacturing plants come the world's finest buffs! Every American Buff is carefully planned to answer the specific problems of the industry . . . expertly produced of the finest quality materials and workmanship. For variety to meet every need . . . for top performance . . . for outstanding economy . . . choose AMERICAN —you can't buy a better buff!



Automatic CENTERLESS BIAS BUFF

This versatile buff does both cutting *and* coloring on a wide variety of metals. Like other American "Automatic" buffs, it features the patented *Centerless* construction with exclusive "Pre-Assembly". Also available with permanent steel or fiberboard centers.

Automatic BIAS SISAL BUFF

Top-quality *all-new* sisal gives this buff unmatched durability and fast cutting. Exclusive "permanizing" process actually *locks fibres together* . . . eliminates scratching and fraying. Available in Centerless model or with Permanent Center.

Automatic UNIT SISAL BUFF

Extra-flexible for fast cutting and finishing on contoured surfaces. Sisal "units", cloth wrapped to prolong wear, follow every crevice and variation in shape. Air-cooled *unit design* prevents burning or discoloration, even at high speeds. In Centerless or Permanent Center types.

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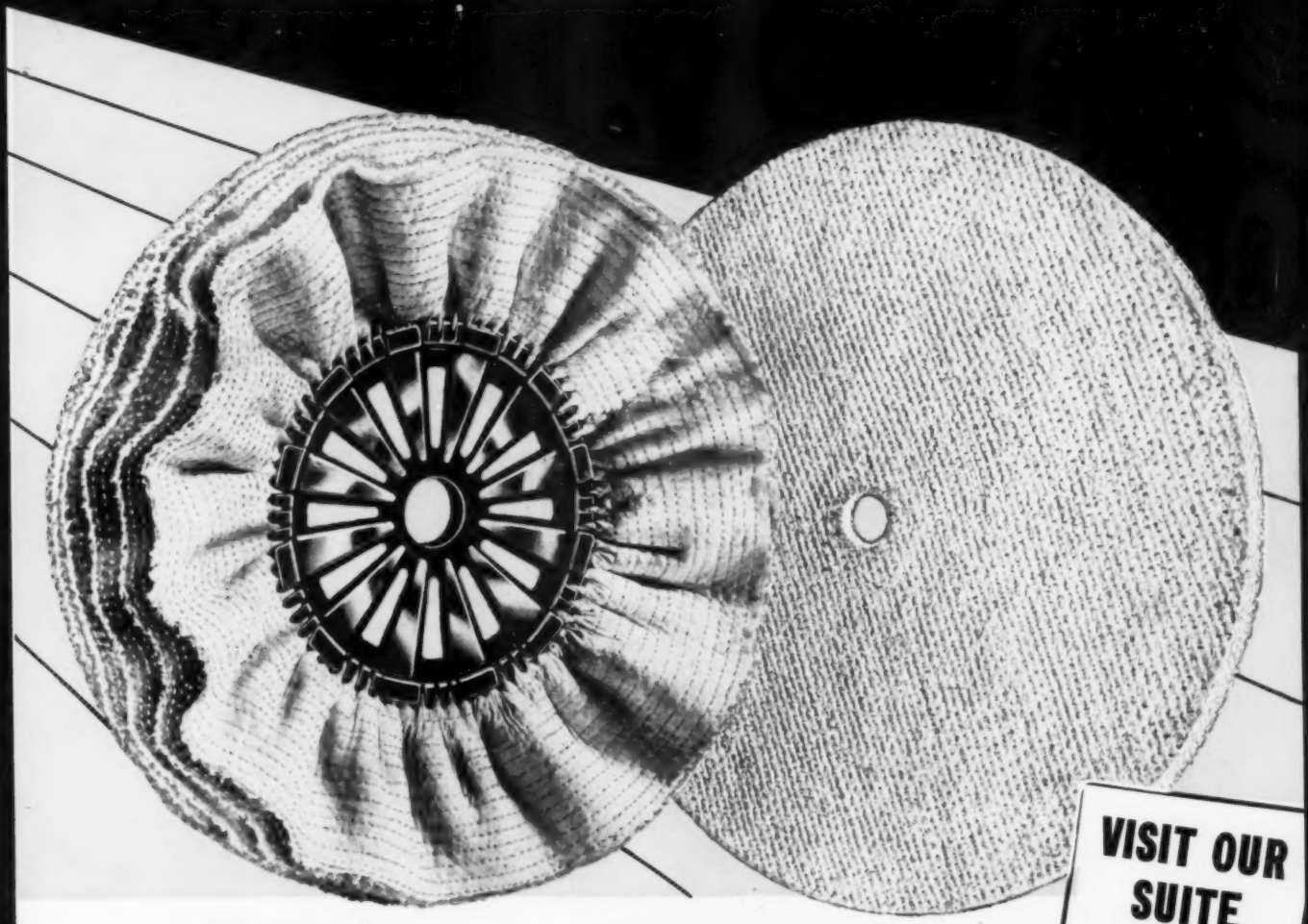

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Ruffled face eliminates troublesome streaking. New, exclusive "open" design combines the best features of both Bias Cloth and Bias Sisal buffs for fast cutting and high lustre finishing. Made of top-grade "Permanized" sisal, with or without cloth layers—in air-cooled Permanent Center construction.

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Top-quality "Permanized" sisal, in a variety of constructions: All-Sisal for even finish; Sisal with Cloth for long wear; Sisal with Krinkle-Kraft Paper for extra-sharp cutting; and Custom-Treated Sisal, for harsh or soft cutting to meet your specific needs.

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ZINC PLATE is a good finish as far as it goes. It can be made to go much further with chromate treating. It can be transformed into a number of outstanding finishes... with extra life, extra eye appeal, extra sales stimulation ... all at little extra cost.

One of the widest lines of chromate treating compounds available, Unichrome Dips can satisfy virtually any requirement ... of product, production method, and pocketbook. Brilliantly clear finishes have been produced for a material cost as little as 30¢ per 1000 sq. ft. of treated surface! Products can be clad for optimum corrosion resistance in a matter of minutes. And you also get an ideal base for clear, dyed, or pigmented organic coatings.

Along with wide selection and quality finishes, goes service. Service from solutions which give good "mileage" Service from M&T engineers who have long experience in metal finishing, and zinc finishing problems in particular. Send for detailed information and handy Unichrome Pick-A-Dip Chart.

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INDICATE A 528. ➤

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This policy of research and testing has rewarded the plating industry with Conducta-Core lead anodes which have greater throwing power, yet last three or four times longer than other lead anodes. Cadmax, addition agent for cadmium plating, is another example of superior materials. So too is Zimax for zinc plating, Nimax, a nickel plating brightener, and new Conmax, a conversion coating for cadmium and zinc plated parts. All do a better job at lower cost.

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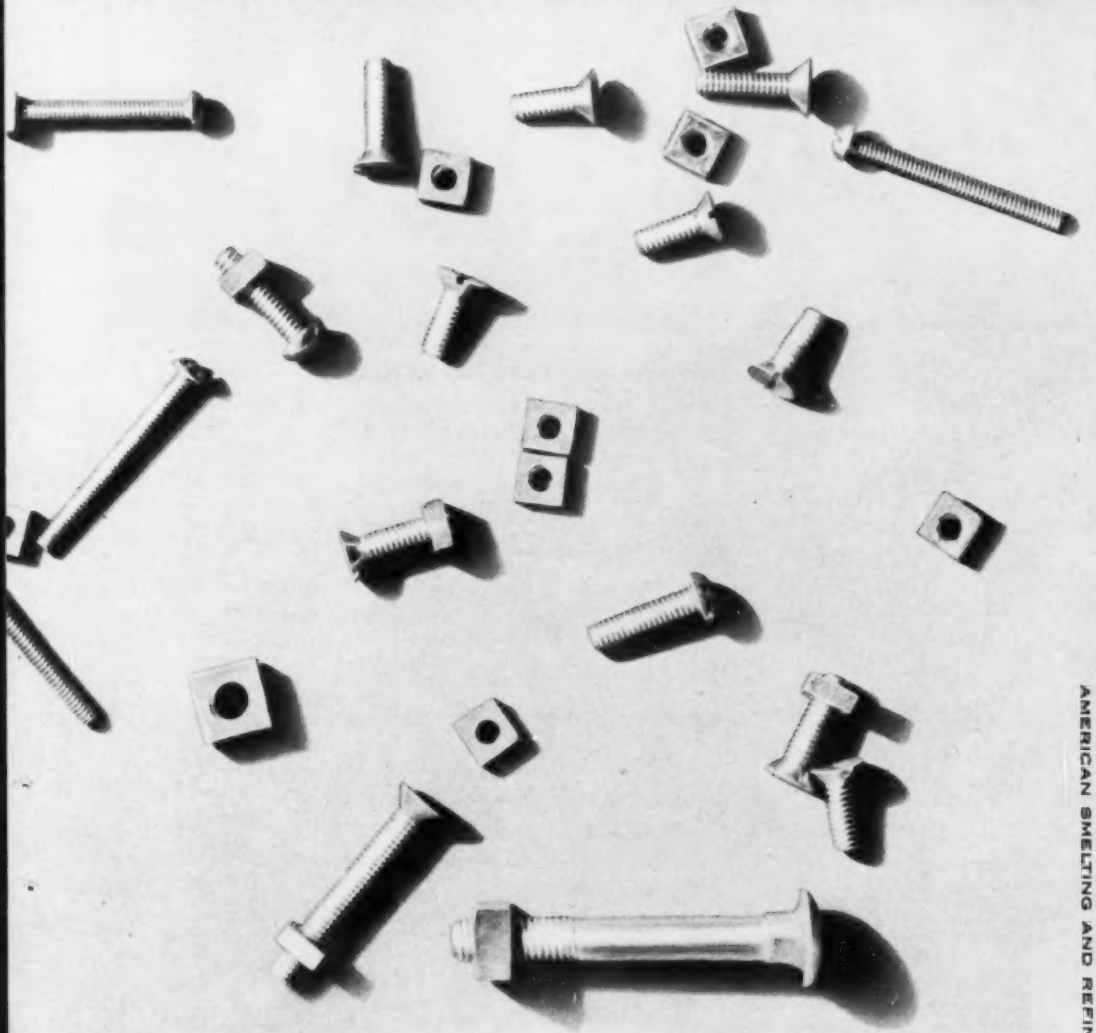

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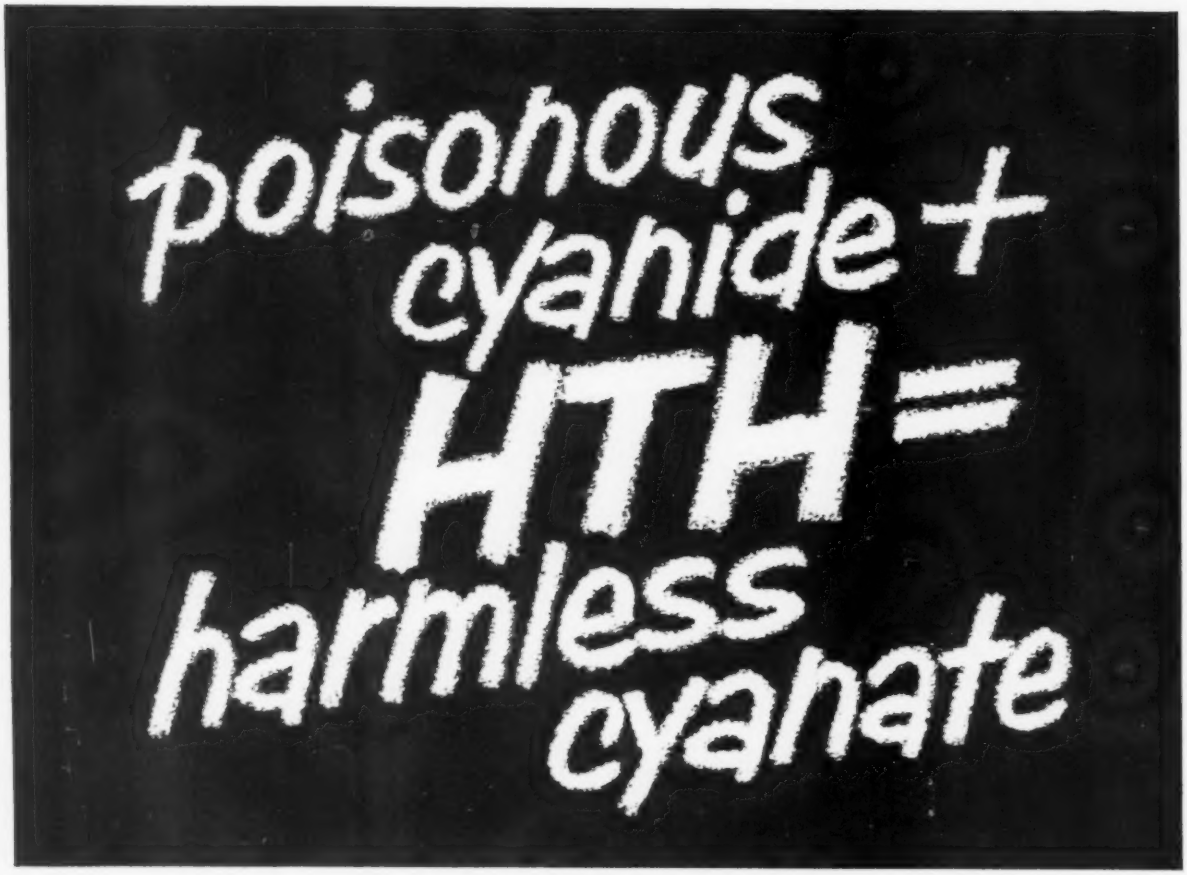
Federated products for the Plating shop include ANODES: Copper; lead, including the famous Conducta-Core; zinc, tin, tin-lead, cadmium, brass, silver. NICKEL SALTS: Constant quality control assures full nickel content and identical plating characteristics from every lot. PLATING ADDITION AGENTS: Cadmax for still or barrel cyanide cadmium plating; Zimax liquid or powder; Nimax for low cost bright nickel plating; Conmax, a conversion coating, for cadmium and zinc plated parts.



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EASY TO USE. HTH comes in a concentrated, dry form, easy and safe to use. It can be added directly to waste solutions. And it's easy to store—stays stable indefinitely.

ECONOMICAL. No costly equipment or technically trained personnel are required when you use HTH. No carboys needed, no breakage loss.

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If you have a cyanide waste problem, try HTH, in either granular or tablet form. HTH has gained wide acceptance as a convenient source of chlorine for effectively eliminating this problem. Write for literature.

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Another plating problem solved by Sel-Rex!

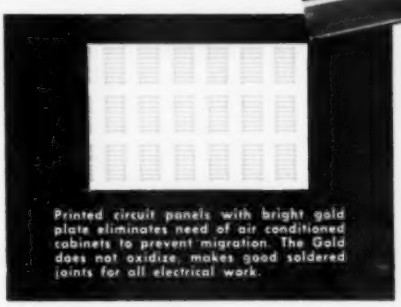
FEDERAL TELEPHONE & RADIO IMPROVES ELECTRONIC COMPONENT RELIABILITY WITH SEL-REX BRIGHT GOLD

Plated with only twenty-millionths of an inch of Sel-Rex Bright Gold over 0.001" of silver, sand-cast bronze electronic chassis showed no evidence of corrosion after a 65-hour salt spray test. This was proved at Federal Telephone and Radio's Clifton, New Jersey plant.

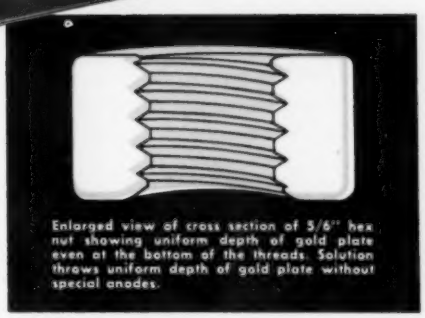
Sel-Rex Bright Gold is used on a variety of electronic parts at Federal because, to quote Mr. William F. Boyle, Chief Metallurgist, the deposits are ". . . fine grained and dense, giving exact duplication of the surface plated . . . (it) eliminates galling in sliding electrical contacts" and has "effected a tremendous saving" over previous materials and methods.

These reasons, and many others, also explain why the instrumentation of the newest rockets, guided missiles, the earth satellites and many of the "hottest" airplanes have Sel-Rex Bright Gold on their electronic equipment and circuitry.

Whatever your plating problem—precious metals, power, equipment or procedures—Sel-Rex Representatives are trained to "Custom Engineer" solutions to our mutual profit. Send for FREE technical data and other case histories, and see for yourself . . . we may have solved your problem last month.



Printed circuit panels with bright gold plate eliminates need of air conditioned cabinets to prevent migration. The Gold does not oxidize, makes good soldered joints for all electrical work.



Enlarged view of cross section of 3/8" hex nut showing uniform depth of gold plate even at the bottom of the threads. Solution throws uniform depth of gold plate without special anodes.

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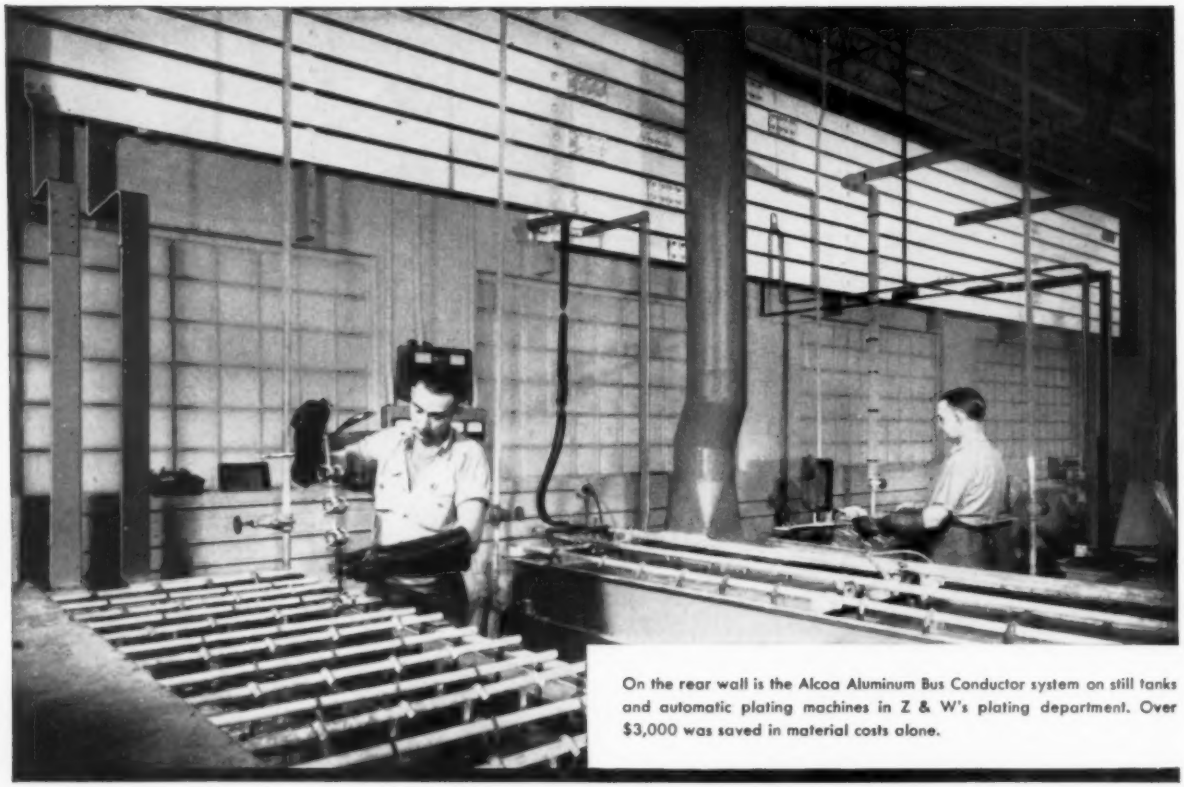
Manufacturers of Exclusive Precious Metals Processes, Metallic Power Rectifiers, Airborne Power Equipment, Liquid Clarification Filters, Metal Finishing Equipment and Supplies.



On the rear wall is the Alcoa Aluminum Bus Conductor system on still tanks and automatic plating machines in Z & W's plating department. Over $3,000 was saved in material costs alone.

$3,000 IN DIRECT SAVINGS

With Alcoa Aluminum Bus Conductor at Z & W Manufacturing

When Z & W Manufacturing Corporation designed their new 130,000 sq ft plant in Wickliffe, Ohio, they wanted equipment second to none—yet costs were closely watched. One of the best of the money-saving acts took place in their plating department.

After a detailed study, they used Alcoa® Aluminum Bus Conductor to carry the 12,000-amp load from individual rectifiers to the six plating lines. Compared to a copper system Z & W got the same conductivity from half as many pounds of metal. Only difference was a slight increase in size. In installing a system using high-conductivity aluminum alloy, Z & W estimates they saved more than $3,000 in direct material costs alone.

Easy fabrication and installation

Other important benefits and savings resulted from aluminum's light weight and easy handling. Also important was the ease of fabrication during their bending and drilling operations. The ½″ x 6″ bars were just bolted to 2 x 8's attached to the wall. Simple insulating washers and wood spacers were used.

Having some small copper bar stock on hand, they used that as leads in some places—other leads were aluminum. Trouble-free joints between copper and aluminum were made, as were all joints, with Alcoa Electrical Joint Compound and aluminum bolts.

Saves 50% on bus conductor

The same technical advice and assistance from Alcoa that enabled Z & W to engineer, design, fabricate and install this bus system are yours for the asking. Study how much you could save with Alcoa Bus Conductor—for expansion or modernization. Cost is about half. Alcoa Bus Conductor is available for immediate delivery from your Alcoa distributor. Look under Aluminum in the Yellow Pages of your phone book. Or write, Aluminum Company of America, 2313-E Alcoa Building, Pgh. 19, Pa.

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EXCITING ADVENTURE
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Used Throughout the Plating Industry

Developed and manufactured by experienced platers

MICCROSOL . . .
Today's outstanding heat-cured rack coating that provides positive insulation and protection, amazing tensile strength and scuff resistance, permanent flexibility, and positive, continuous adhesion.

MICCROTAPE . . .
An extruded tape that offers unexcelled protection for plating racks, and for masking parts prior to selective plating.

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An extruded tubing especially suited for use on straight or bent contact wires, and for selective plating of simple parts.

MICCROTEX . . .
A synthetic air-dry rack coating for all plating cycles and phosphate coatings—highly resistant to all plating solutions.

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For masking of machined parts for all plating cycles. Hairline demarcation . . . extreme accuracy.

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For masking of machined parts for hard chromium plating. Provides complete protection—assures extreme accuracy.

MICCROPEEL . . .
Specifically designed to supply the need for a stop-off lacquer that can be peeled easily from the part after plating, and will hold a hairline demarcation through all plating cycles.

MICCROLAC . . .
Mirror-finish, water-white lacquer that protects and beautifies the finest of polished or plated metals.

MICCROSTRIP "A"...
A blend of the new fast solvents for the quick, easy removal of stop-off lacquers in selective plating.

MICCROLOID . . .
Industrial corrosive-resistant coating for use on all plating equipment, rinse tanks, structural steel, walls, floors, pipe lines, air ducts, etc.

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Two widely used waxes for selective stop-off, especially suited for masking on complicated parts and sharp edges. C-562 for hard chromium; C-600 for high-temperature cycles.

● *Samples and descriptive literature of all Miccro Products will be sent upon request.*

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MILLIKEN FABRICS for BUFFS

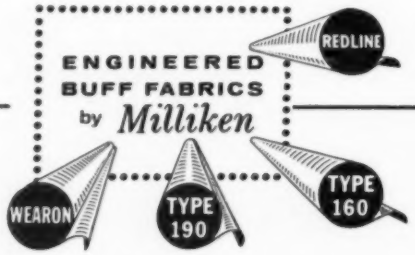
Giving the best buff cost/performance ratios

In a sense you have been to a series of Masquerade Parties attended by two of our four Belles: Type 190 and Type 160. Millions of yards of these two top fabrics have been delivered to buff manufacturers . . . and in all probability are in some of the buffs you are using in your shop today. But until now there has been no identification of these fabrics.

Now, the time has come to tell you of our 'behind the scenes' service . . . to remove our masks, so to speak, and introduce our fabrics so you will know their names, their performance values and their trademarks.

At the right are brief descriptions of our present line of four different Milliken Fabrics. Each fabric has been woven and specially processed to meet one or more broad buffing requirements. The appropriate trademark will be printed on each yard of fabric so that you can identify the cloth used in each section as buffs come into your plant.

Because our cloths have had no identifying marks in the past and because each of these four Milliken Fabrics has different buffing characteristics, we suggest that you test out all four. Ask your buff supplier to make up some buffs of the proper type and size so that you can test them in your own shop on your own production. This will not only bring you up to date on relative values but enable you to try out the two cloths not familiar to you . . . Redline and Wearon. Once the cloth with the best buff cost/performance ratio for your production has been established, then stay with the identified fabric: Type 190, Type 160, Redline or Wearon. Specify it each time you order buffs. The printed trademark is your guarantee that you are getting the quality fabric you want.



Like to Introduce Ourselves

Type 190
FABRIC ENGINEERED by *Milliken*

Today the most widely used cloth in buffing. Engineered by Milliken Research for "cut and color" work, type 190 has become the industry standard — the work horse of every buffing shop.

Type 160
FABRIC ENGINEERED by *Milliken*

A companion to type 190 where industry needs a softer fabric— for those jobs between "cut and color" and fine coloring work.

Redline
FABRIC ENGINEERED by *Milliken*

A recent addition to the family, REDLINE was engineered to meet the need for heavier work, particularly where emphasis is on metal removal.

Wearon
FABRIC ENGINEERED by *Milliken*

A real solution to the tough jobs, particularly where "raking" is involved. Developed through four years of intensive research and fully field tested, WEARON has been added to the line to meet the unusual problem. WEARON gears itself to the job. It heads up more quickly than other fabrics, requires less compound and resists fraying and tearing. It is particularly durable in cutting down flashings and fins and in buffing irregular shapes.

DEERING, MILLIKEN & CO. INC.
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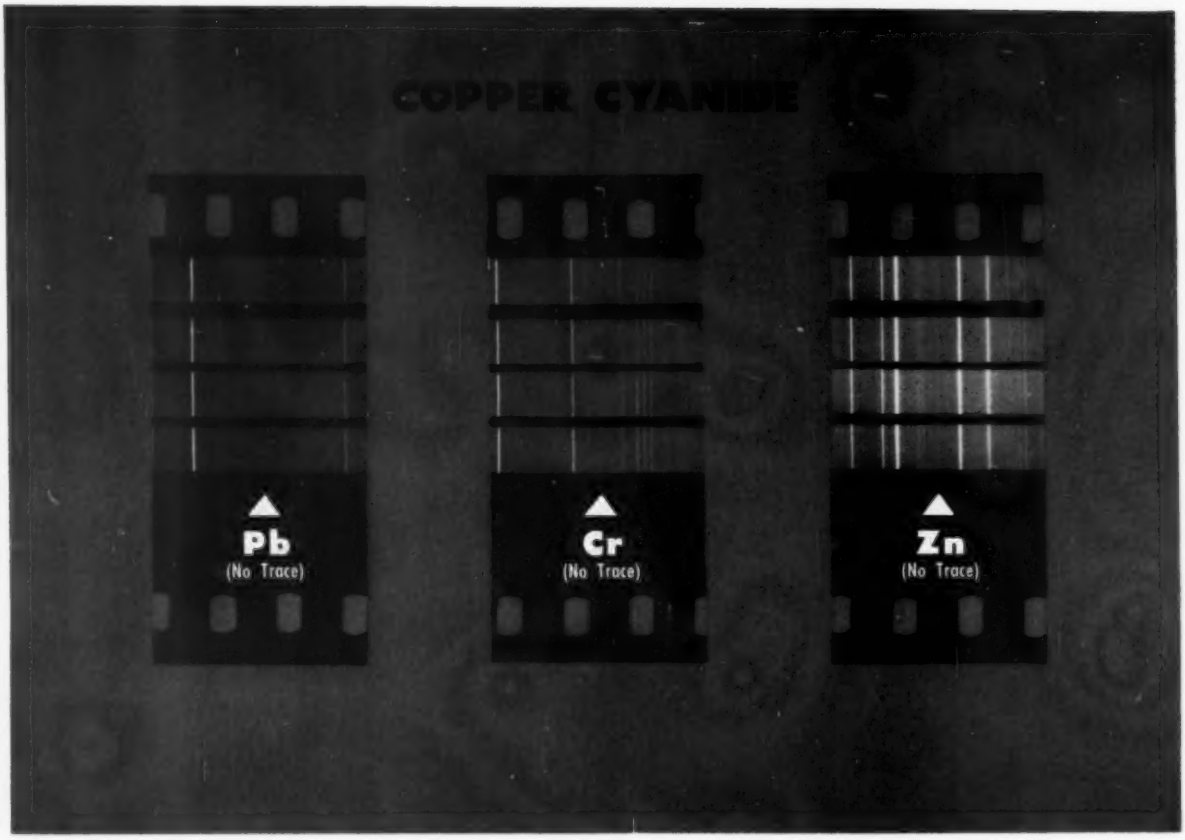

Spectrographic Analysis PROVES CP's Copper Cyanide CONSISTENTLY Free From Impurities

Whenever you use CP's Copper Cyanide you can be *sure* of its purity and dependability . . . because every batch is carefully tested.

The photographs above illustrate the absence of any trace of lead, zinc or chromium. This film record is typical. In addition, our Copper Cyanide is completely free of sulphur or organic contamination. In tests run on production samples over an 18 month period, no deviation in purity was noted. The quality of all our products is constantly checked both by spectrographic analysis and under actual working conditions. Our own findings are confirmed by tests on a typical production sample by an independent laboratory, Ledoux & Company.

As domestic producers, we offer reliability of source, through conveniently located distributors.

Investigate the advantages of CP's Copper Cyanide. We will be happy to send you a copy of the Ledoux & Company Analysis Report and a sample for your own testing, without obligation of course.

CP COPPER PIGMENT & CHEMICAL WORKS, INC.

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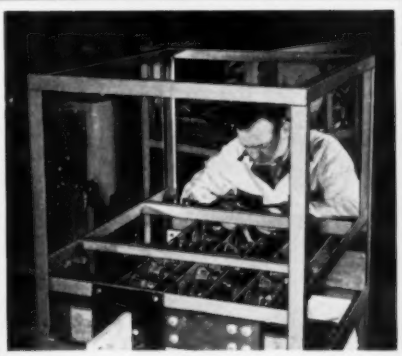
Products for Progress In Metal Protection

Wagner BROTHERS INC.



A *NEW* "PRODUCT FOR PROGRESS IN METAL PROTECTION"—

The Wagner Brothers Silicon Electroplating Rectifier. Unequalled freedom from maintenance and down-time at approximately the same cost as selenium, less than germanium rectifiers. Twelve high purity silicon cells over 1" in diameter provide great ability to withstand transients of several hundred volts. Outstanding efficiency even in high ambient temperatures to 200°.

Wagner Brothers' finest Product for Progress in Metal Protection is Service. Whether you use Wagner Brothers' anodes, chemicals, rectifiers, automatic plating machines and parts handling equipment — any or all of these — their performance is magnified to a large degree by the periodic or specific attention our sales representatives provide. They not only work right along with you and your plating department, they take your problems back to Wagner Brothers' research staff for the finest analysis and solutions available in the industry. For complete information on the Wagner Brothers line of Products for Progress in Metal Protection — or for immediate assistance — write or call the Wagner man in your area or contact the factory sales offices in Detroit.

MANUFACTURERS AND PROCESSORS OF ALL METAL-FINISHING CHEMICALS, ANODES, AND EQUIPMENT

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Wagner BROTHERS INC.

Speed

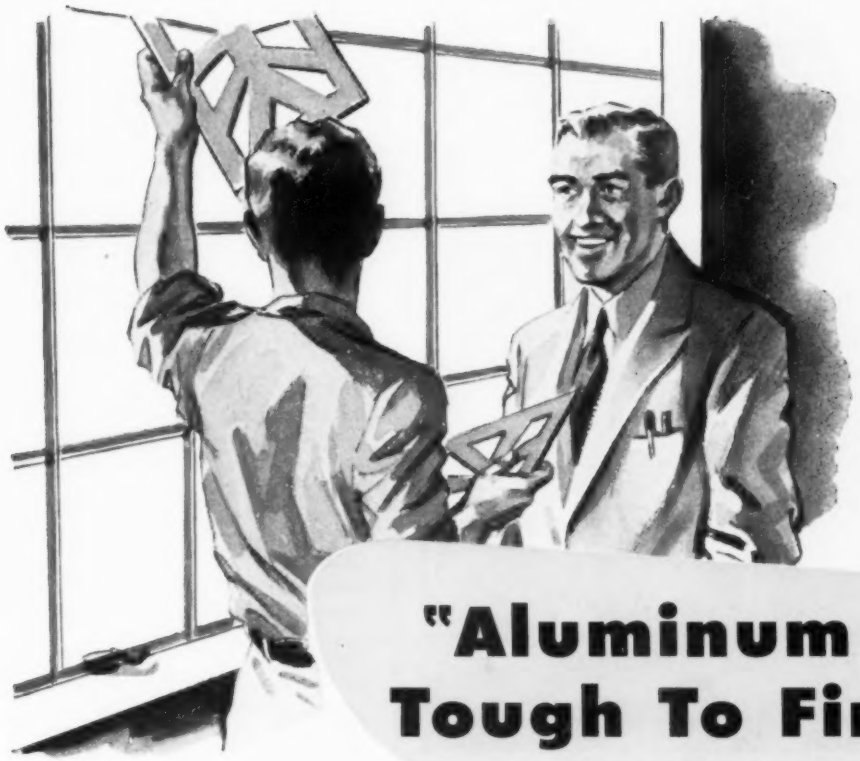
Diamond CPA 1800 speeds up chrome-plating time!

DIAMOND CPA 1800 is *the additive* for chrome plating which expands tank capacity, improves throwing power and the metallurgical character of chrome plate. It's the modern teammate of DIAMOND CHROMIC ACID!

And, when you order your chromic acid from Diamond, you get the latest facts on *all* phases of chromic acid application, research and testing. Facts that can help you lick a production problem, quality problem, or research problem.

So, call your Diamond Representative, or your nearby Diamond Distributor, now. They can help you get quality chrome-plating jobs *every time*, based on our broad experience with plating. DIAMOND CHROMIC ACID is available where and when you need it. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals



"Aluminum WAS Tough To Finish...

. . . before Northwest developed these SPECIAL ALUMINUM CHEMICALS."

If you work with aluminum you'll be interested in Northwest's outstanding line of chemicals for use with modern alloys. Northwest's continuing research and development program has earned them the reputation of "First with the best" in this rapidly developing field. It will pay you to investigate:

Got a Problem?
Let our Cleaning Specialists help you!

- **ALKALUME CLEANERS**—A full line of cleaners and etching compounds especially formulated for use on aluminum alloys prior to plating, anodizing, painting or welding.
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Plating Progress

Published by SEL-REX CORPORATION

MAY 1958 NUTLEY 10, NEW JERSEY No. 2

Miss Shirley Temple watches "hair growing" on Ideal doll's head.

Ideal Toy Increases Electroforming Production With Sel-Rex Filter to Clarify Critical Solutions

To produce the life-like quality for which their famous Shirley Temple Dolls are noted, Ideal Toy Company usually electroforms masks for doll faces, arms, legs and torsos. Whether you electroform doll molds, record masters, or critical guided missile components, proper filtration is an absolute must. That's why Ideal, like hundreds of other electroformers and platers, specify a Sel-Rex Filter.

In other words, quality first. If you can maintain the quality customers demand and increase production at the same time . . . why not? Ideal Toy did it. "...our Sel-Rex Filter has helped us increase production appreciably." states Mr. A. R. Miller, Chief Chemist. And since this firm operates in a fiercely competitive industry, almost any advantage becomes a competitive edge which adds to profits.

If your manufacturing operation entails liquid clarification or solids recovery a Sel-Rex Filter may help to increase your profits. Standard models range from 250 to 18,000 gallons per hour capacities, and feature stainless steel mesh elements, interchangeable with a porous stone. Our 12-page literature gives details on other profit-increasing features. Ask for #F-6.

FREE LITERATURE CORNER

Just Off The Press . . .

- ☐ PR-1 • Completely new "Guide" to Plating Rectifiers—20 pages, illustrated
- ☐ RX-2 • Rhodium Electroplating Processes—12 pages, demonstrations & charts
- ☐ JP-1 • Jet Plater — Technical Data Bulletin.
- ☐ AC-4 • CuSol Acid Copper Process, tree-free heavy deposits—technical report

Still Available . . .

- ☐ BR-a • Gold Plating, Industrial & Decorative, by E. C. Rinker—8 pages, illustrated
- ☐ FD-b • Gold Plating in Electronics by Federal Telephone & Radio—4 pages, illustrated
- ☐ F-6 • Electroplating Solution Filter—12 pages illustrated, technical data.

NOTE: For your convenience, when requesting the literature you want, simply refer to it by the prefixed code.

Double Thick Rhodium Plate

Rhodium electroplate of at least twice the thickness possible with conventional Rhodium formulations is being obtained with Sel-Rex Rhodex, the only Rhodium process which yields compressively-stressed deposits. Reports from government agencies and private industry indicate that Rhodex electroplate in thicknesses exceeding one-thousandth-of-an-inch are commonplace. Ordinary Rhodium plate generally fractures and fails at half that thickness.

A 24-page brochure tells you all about plating with Rhodium. Ask for #RX-2.

Low Cost Precious Metals Plating With Portable Automatic Machine

How to plate with precious metals, do a quality job, and still cut costs substantially, has been demonstrated by Wallace & Tiernan Co., Inc., Belleville, New Jersey. According to actual production records, a Sel-Rex Jet Plater *saved 932 hours on the first two jobs.* This entailed Gold plating flasher and lamp changing components used in Wallace & Tiernan Aids to Navigation equipment.

The totally new Jet Plater is a complete electroplating plant in a streamlined cabinet measuring only 34" x 28" x 33" high. Several new models permit either rack or barrel plating with any cold alkaline solution and most of the usual acid solutions. Quality plating at high speed is possible through the ideal system of a pump and jet orifice manifold at the bottom of the plating tank. Constant swirling of the solution around the work assures smooth, even deposits at higher speeds than possible through mechanical agitation methods.

Completely automatic in operation, the Jet Plater features a panel board containing dual scale ammeter, powerstat control for rectifier, circuit breakers, and automatic timer which sounds alarm upon completion of the plating cycle. Bulletin JP-1 gives complete details and specifications, including the wide range of recommended plating solutions.

ALKALINE NICKEL PLATING

by EDWARD B. SAUBESTRE*

Nickel is one of the few metals plated commercially on a large scale which is almost never deposited from alkaline solutions. Some reasons for this are reviewed. Equilibrium data for various complexing agents are used to calculate deposition potentials for nickel. It is shown why caustic and cyanide baths cannot be used for alkaline nickel plating. It is concluded that polyphosphates and ammonia are suitable inorganic complexing agents, while dibasic carboxylic acids, alpha-hydroxy carboxylic acids, alpha-amino acids, and amines are suitable organic complexing agents. Some examples are given of solutions which have been presented in the literature, notably for plating on zinc. An illustration is also given of how the author adapted the alkaline electroless nickel bath to electroplating.

I. GENERAL CONSIDERATIONS

NICKEL AND CHROMIUM, alone of all the metals commercially plated on a large scale, are almost never deposited from alkaline solutions. This is somewhat surprising in the case of nickel especially, since many suitable complexes exist which could be used. Alkaline baths might offer advantages in some specific applications. For example, throwing power and covering power are superior, thick deposits show much less tendency to treeing or nodule formation, and it is possible to operate at higher current densities without encountering burning of the deposit in unbuffered solutions.

Perhaps one of the reasons that alkaline nickel has not become popular is that deposits from such baths are generally stressed. However, as a rule of thumb, it may be stated that the properties of nickel deposits from alkaline solutions are similar to those obtained from bright organic nickel baths, with which the plater is already very familiar, with the exception of the higher stress. Perhaps another reason is that the old stand-by of alkaline plating, the cyanide bath, cannot be used in the case of nickel plating. The reason for this will now be studied in some detail.

We will use deposition potential data to determine whether or not nickel can be plated from a given alkaline bath. The words "potential" or "voltage" will be used to refer to the potential drop between the cathode and the solution, and not to the cell voltage. The potential involved in deposition of a metal is made up of a standard potential (which may be determined by looking up standard potential values in reference works, such as Latimer's "Oxidation Potentials") as modified by activation overvoltage and the activity of the depositing ion at the cathode. This deposition potential must then be compared with that for hydrogen evolution. If the metal deposition potential is greater than that for hydrogen, then the metal will be deposited at reasonable efficiencies. However, if the metal deposition potential is less than that for hydrogen, or is very nearly the same, then metal deposition either will not occur at all, or will occur only at very low efficiencies.

Deposition Potential

The deposition potential (E) of a metal may be defined as:

$$E = E^\circ - \eta_a - \eta_c$$

where E° is the deposition potential at standard concentration (or, more accurately, standard activity) of the ion being plated, η_a is the activation overvoltage, and η_c is the correction factor for the change in potential caused by the metal ion not being present at the cathode at standard activity. The latter term, η_c is made up of two parts: the effect due to concentration of the ion in the bulk of the solution, and concentration overvoltage in the cathode film. Concentration overvoltage will be disregarded since the complexes to be considered in this paper will lead to very small values for the activity of the nickel ion in the bulk of the solution. Thus, the effect of concentration overvoltage should be small in comparison with other correction factors.

*Sylvania Electric Products, Inc., Flushing 54, New York.

Standard Deposition Potential

According to Latimer (op. cit.), nickel and hydrogen have the following standard potentials:

$$Ni^{++} + 2e = Ni \qquad E^\circ = -0.25$$
$$2H^+ + 2e = H_2 \qquad E^\circ = 0.00$$

The value for hydrogen, of course, is the arbitrary reference point for all deposition potentials. The nickel potential is not accurately known, since a reversible equilibrium cannot be obtained in practice. Latimer quotes several values ranging from −0.227 to −0.248 v. However, from thermodynamic considerations, Latimer prefers the above value, and this is the one we shall use.

Activation Overvoltage

The activation overvoltage for nickel deposition may be calculated from the following arrangement of the Tafel equation, where i is the current density, and i_o is the exchange current, which is a constant for a given metal ion:

$$\eta_a = \frac{RT}{F} \log \frac{i}{i_o}$$

According to Kortum and Bockris,[1] the value of i_o for nickel is 10^{-12} g-ions/cm²-sec. From this information it can be calculated that at 20C, and for current densities of 50–100 asf, the activation overvoltage for nickel is 0.38 to 0.40 v.

The activation overvoltage for hydrogen evolution may be calculated in the same manner. The Tafel equation may be rearranged in the following (more common) form:

$$\eta_a = a + b \log i$$

where, for hydrogen evolution on nickel, according to Potter,[2] a = 0.65 and b = 0.101 for alkaline solutions at 20C (where i in the equation above is expressed as amps/cm²). Thus we calculate, at 20C and 50–100 asf, an overvoltage of 0.52–0.55 v. for hydrogen evolution.

Concentration Effects

The equation for calculating concentration effects is:

$$\eta_c = -\frac{RT}{zF} \log (a_{Ni^{++}})$$

The activity of the nickel ion in a complex ion solution may be calculated from the dissociation constant:

$$Ni(A)_x^{n+2} = Ni^{++} + xA^n$$
$$K = \frac{[Ni^{++}][A^n]^x}{[Ni(A)_x^{n+2}]}$$

where A is the complexing agent (ion or compound), n is its valence, x depends on the coordination number of nickel (4 or 6) and K is the dissociation constant of the complex ion. In the calculations made in this paper, the activity of all ions and complexes will be assumed to be unity, and the activity of the nickel ion will then be calculated on this basis.

For hydrogen, the effect of concentration may be readily expressed in terms of *p*H:

$$\eta_c = -\frac{RT}{zF} \log (a_{H^+}) = \frac{RT}{F} pH$$

Unless otherwise stated, we will assume a *p*H of 11 in the cathode film. This leads to a value of 0.65 v for η_c for hydrogen.

Nickel vs. Hydrogen

By combining the above standard potentials with the appropriate correction factors, the following comparison is obtained between nickel and hydrogen:

$Ni^{++} + 2e = Ni$ $\quad E = E^\circ - \eta_a - \eta_c$
$= -0.25 - (0.38 \text{ to } 0.40) + 0.0295 \log K$
$= -(0.63 \text{ to } 0.65) + 0.0295 \log K$

$2H^+ + 2e = H_2$ $\quad E = 0.00 - (0.52 \text{ to } 0.55) - 0.059\ pH$
$= -(0.52 \text{ to } 0.55) - 0.059\ pH$

As indicated above, whichever of these two is the larger value will determine which is the preferred cathode reaction.

II. NICKEL DEPOSITION IN INORGANIC COMPLEX BATHS

Nickel vs. Hydrogen in Cyanide Baths

Cyanide is the most commonly used complexing agent for alkaline metal plating baths, since it complexes adequately such a large number of metal ions. The dissociation constant for nickel, according to Hume and Kolthoff[3] is:

$$Ni(CN)_4^= = Ni^{++} + 4\ CN^- \qquad K = 10^{-22}$$

For standard activity of the cyanide ion, this leads to a value of η_c of 0.65 v. at 20C. From this, we may calculate the relative ease of deposition of nickel and hydrogen in cyanide solutions:

$Ni^{++} + 2e = Ni$ $\quad E = E^\circ - \eta_a - \eta_c$
$= -0.25 - (0.38 \text{ to } 0.40) - 0.65$
$= -1.28 \text{ to } -1.30 \text{ v.}$

$2H^+ + 2e = H_2$ $\quad E = 0.00 - (0.52 \text{ to } 0.55) - 0.65$
$= -1.17 \text{ to } -1.20 \text{ v.}$

for the previously established conditions of 20C and 50–100 asf.

Thus, it is seen that the potential for hydrogen is the larger of the two, and is therefore favored. This means that nickel plating from a cyanide bath will probably never be feasible.

Nickel vs. Hydrogen in Caustic Baths

Along with a great many other metals, nickel ion precipitates as an insoluble hydroxide as the *p*H is increased in acid baths, but re-dissolves again in excess caustic with the formation of a complex hydroxide ion. Gayer and Garrett[4] give the following equilibrium data:

$$Ni(OH)_2 = H^+ + HNiO_2^- \qquad K = 6 \times 10^{-19}$$

According to Latimer's "Oxidation Potentials" the dissociation constant for nickel hydroxide is:

$$Ni(OH)_2 = Ni^{++} + 2\ OH^- \qquad K = 1.6 \times 10^{-16}$$

Combining these two equilibria, we obtain a value for η_c of 0.34 v. For the previous conditions, this leads to a deposition potential value of −0.97 to −0.99 v. However, the deposition potential for nickel in caustic solutions is *p*H sensitive, as is obvious from the following overall reaction:

$$HNiO_2^- + H_2O + 2e = Ni + 3\ OH^- \qquad E^\circ_R = -0.59$$

The potential values given just above are for standard activity of the hydroxide ion. The following data give the corrected value of the deposition potential as a function of

*p*H for both nickel and hydrogen deposition (at 50 asf, and for the same activation overvoltage as previously):

*p*H	$a_{HNiO_2^-}$	$E_{Ni^{++}}$	E_{H^+}
14	6×10^{-5}	−0.97	−1.34
13	6×10^{-6}	−0.91	−1.29
12	6×10^{-7}	−0.85	−1.23
11	6×10^{-8}	−0.79	−1.17
10	6×10^{-9}	−0.73	−1.11
9	6×10^{-10}	−0.67	−1.05

One important conclusion which can be drawn from the above table is that the difference in potential between nickel and hydrogen is independent of *p*H, i.e., in a caustic solution, the cathode current efficiency is independent of *p*H. However, it is equally obvious that the amount of nickel in solution is also very small. Even at *p*H = 14, the activity of $HNiO_2^-$ is only 6×10^{-5}. Thus, the bath would have to be operated with an excess of nickel hydroxide precipitate, and the plating speed would be limited by the length of time required to dissolve nickel hydroxide as nickel is deposited from the solution. Thus, nickel can indeed be plated from a straight caustic solution, but only very slowly, and in the presence of excess precipitate.

Nickel vs. Hydrogen in Ammoniacal Baths

All of the transition metals form ammonia complexes readily. In the case of nickel, $Ni(NH_3)_4^{++}$ and $Ni(NH_3)_6^{++}$ are known. Bjerrum[5] reports the following equilibrium data:

$$Ni(NH_3)_4^{++} = Ni^{++} + 4\,NH_3\,(aq) \qquad K = 10^{-8}$$

From this, η_c is calculated as −0.23 v. Or, for the same conditions as previously,

Nickel: E = −0.86 to −0.88 v.
Hydrogen: E = −1.17 to −1.20 v.

Thus, nickel deposition from ammoniacal solutions is feasible, and should be possible at quite high current efficiencies.

Nickel vs. Hydrogen in Phosphate Baths

The commonly used phosphate, derived from ortho phosphoric acid, H_3PO_4, does not form complexes with nickel. However, many of the polyphosphates do. Among these are the pyrophosphate ion, $HP_2O_7^{-3}$, and several metaphosphate ions. Metaphosphoric acid tends to polymerize:

$$n\,HPO_3 = (HPO_3)_n = H_3P_3O_9 \text{ (for example)}$$

According to Davies and Monk[6], n is commonly 3 or 4. These same authors found that in solutions containing sodium hydroxide, $Na_5P_3O_{10}$ tends to be formed, i.e.,

$$P_3O_9^{-3} + 2OH^- = P_3O_{10}^{-5} + H_2O$$

This trimetaphosphate forms a complex with nickel, according to Jones et al,[7] Van Wazer[8] and McCune.[9] Jones gives:

$$NiP_3O_{10}^{-3} = Ni^{++} + P_3O_{10}^{-5} \qquad K = 10^{-3.2}$$

From this, η_c is calculated as −0.09 v. Or, for the same conditions as previously

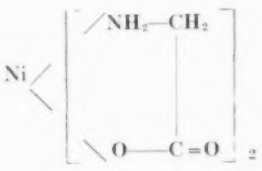
Nickel: E = −0.72 to −0.74 v.
Hydrogen: E = −1.17 to −1.20 v.

Thus, nickel should be readily deposited from alkaline polyphosphate solutions.

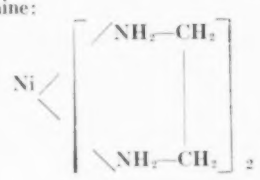
III. NICKEL DEPOSITION IN ORGANIC COMPLEX BATHS

Four common inorganic complexing agents have been considered above: cyanide, caustic, ammonia, and polyphosphate. In addition, there are a number of organic materials that will complex nickel in alkaline solutions These materials "chelate" the nickel, that is, they form a heterocyclic ring containing the nickel ion, attached by coordination bonds to two or more non-metal (C O, N) atoms in the organic molecule. According to Bailar[10] such rings generally have 5–6 members. He gives the following illustrations of how nickel can be chelated:

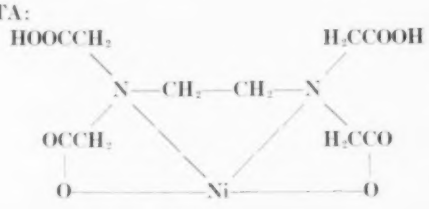
Glycine:



Ethylenediamine:



EDTA:



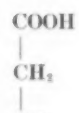
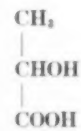
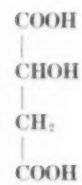
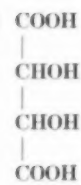
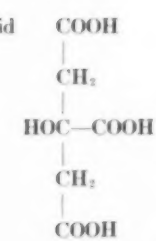
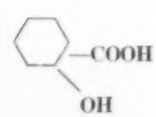
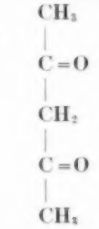
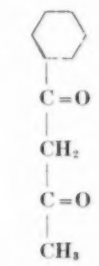
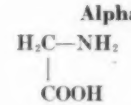
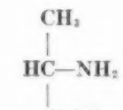
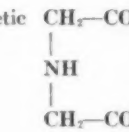
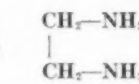
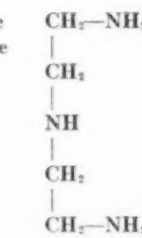
There are five types of such chelating agents which are of interest in complexing nickel:

1. Dibasic carboxylic acids
2. Alpha-hydroxycarboxylic acids
3. Conjugated ketones
4. Alpha-amino acids
5. Amines

Unfortunately, equilibrium data are not available for many of these compounds, but it is known that among these chelating agents, ethylene diamine, EDTA, lactic, malic, tartaric (Rochelle salt), and citric acids may be used in nickel deposition. Available data are summarized in Table I.

Deposition potentials were calculated using the assumptions given on p. 480. It is then found that, at 20C and 50–100 asf, nickel deposition is expected to occur in preference to hydrogen at *p*H = 11, as long as the activity of the nickel is at least 1.6×10^{-18}. From Table I, then, it appears that this will be the case for all of the organic complexes except EDTA (ethylene dinitrilo tetraacetate). In order to

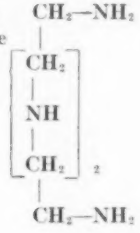
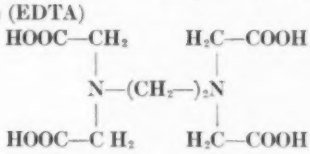
TABLE I
ORGANIC NICKEL COMPLEXES

Compound	Formula	−log K	Solubility (g/l H_2O)	Reference
Dibasic Carboxylic Acids				
Oxalic Acid		5.5	95 (15°)	11
Malonic Acid		4.0	735 (20°)	12
Succinic Acid		...	68 (20°)	..
Alpha-Hydroxy Carboxylic Acids				
Glycolic Acid		...	(s)	..
Lactic Acid		−0.54	(infin.)	13
Malic Acid		...	(v. s.)	..
Tartaric Acid		...	206 (20°)	..
Citric Acid		...	1330	..
Salicylic Acid		...	1.8 (20°)	..
Conjugated Ketones				
Acetyl Acetone		6.8	125	14
Benzoyl Acetone		7.0	(sl. s.)	..
Alpha-amino Acids				
Glycine		6.2	253 (25°)	15
Alanine		6.0	166 (25°)	16
Iminodiacetic Acid		8.2	24 (5°)	..
Amines				
Ethylene Diamine		7.7	(s.)	17
Diethylene Triamine		10.7	(infin.)	18

(Continued)

TABLE I (Continued)

ORGANIC NICKEL COMPLEXES

Compound	Formula	−log K	Solubility (g/l H_2O)	Reference
Amines (Continued)				
Triethylene Tetramine		14.1	.....	19
Ethylene Dinitrilo Tetraacetate (EDTA)		18.4	.....	20

have a practical plating solution, it is also necessary that the solubility of the organic complexing agent in water be quite high. In light of these two criteria, then, the amines and the alpha-hydroxy carboxylic acids are the most promising agents to use (no equilibrium data exist for the latter, but it is known from experience that these compounds complex nickel suitably). Table II summarizes the potential data.

IV. NICKEL DEPOSITION IN Ni^+ BATHS

In electroplating practice, nickel is always thought of as existing in the +2 valence state. However, according to Latimer in "Oxidation Potentials," nickel may exist in the +1 valence state in cyanide solutions, with strong reducing agents being capable of converting ordinary nickel salts into NiCN. Thus, Grube[21] reports:

$$Ni(CN)_4^{-3} = Ni(CN)_4^{-} + e \qquad E°_B = 0.82 \text{ v.}$$

From this, η_e is calculated as −0.73 v. Hence,

Nickel: E = −1.36 to −1.38 v.
Hydrogen: E = −1.17 to −1.20 v.

Thus, it is concluded that it is not practical to plate nickel from NiCN baths any more than it is from $Ni(CN)_2$ baths.

It might be mentioned in passing that the Ni^+ ion is stable in alkaline cyanide solutions, and does not disproportionate to Ni and Ni^{++}:

$$Ni + Ni(CN)_4^{-} + 4\,CN^- = 2\,Ni(CN)_4^{-3} \qquad E°_B = 0.08$$

V. LIMITING *p*H IN ALKALINE NICKEL BATHS

The above discussion indicates that many compounds, both inorganic and organic, may be used to complex nickel in alkaline baths. Not all of them are suitable for nickel plating however; water solubility must be high; the complex must not be more stable than that corresponding to a nickel ion activity of 1.6×10^{-18}, lest hydrogen be evolved (for the set of conditions chosen); the complex must not be too unstable, lest the nickel precipitate as the hydroxide. The first two points have been considered above. We will now consider the question of the limiting *p*H. Using the formula on p. 480, the nickel ion activity in the complex ion solution may be calculated. If this exceeds the amount of nickel permissible in the equilibrium:

$$Ni(OH)_2 = Ni^{++} + 2OH^- \qquad K = 1.6 \times 10^{-16}$$

then $Ni(OH)_2$ will be precipitated. The maximum activity of Ni^{++} and $HNiO_2^-$ as a function of *p*H is:

*p*H	$a_{Ni^{++}}$	$a_{HNiO_2^-}$
14	1.6×10^{-16}	6×10^{-5}
13	1.6×10^{-14}	6×10^{-6}
12	1.6×10^{-12}	6×10^{-7}
11	1.6×10^{-10}	6×10^{-8}
10	1.6×10^{-8}	6×10^{-9}
9	1.6×10^{-6}	6×10^{-10}

TABLE II

DEPOSITION OF NICKEL FROM ALKALINE SOLUTIONS

Deposition Potential and Limiting pH for Various Complexing Agents

Conditions: 20°C
50 asf
*p*H = 11
All ions at unit activity, except nickel and hydrogen

Solubility: Complex considered soluble if a 1 M Nickel solution can be prepared.

Complex	E (v)	Limiting pH	Soluble
Trimetaphosphate	−0.72	9.8	Yes
Malonate	−0.75	10.3	Yes
Oxalate	−0.79	11.0	No
Hydroxide (*p*H = 11)	−0.79	....	No
Glycine	−0.81	11.3	Yes
Acetyl Acetone	−0.83	11.5	Yes
Benzoyl Acetone	−0.84	11.8	No
Ammonia	−0.86	12.2	Yes
Ethylene Diamine	−0.86	12.2	Yes
Iminodiacetic Acid	−0.87	12.3	No
Diethylene Triamine	−0.95	13.7	Yes
Hydroxide (unit activity)	−0.97	14.0	No
Triethylene Tetramine	−1.04	....	Yes
Ethylene Dinitrilo Tetraacetate (EDTA)	−1.17	....	Yes
Hydrogen (*p*H = 11)	−1.17	....	...
Cyanide (Ni^{++})	−1.28	....	Yes
Cyanide (Ni^+)	−1.36	....	Yes

Table II summarizes the *p*H value above which $Ni(OH)_2$ will precipitate, for the various complexing agents.

VI. SUMMARY OF CALCULATED DATA

Table II summarizes the above discussions. It is realized that many assumptions have been made above, some of which are not entirely justifiable in practical alkaline nickel plating solutions, but since similar assumptions were made for all nickel complexes, the relative ranking should be fairly accurate. In practical terms then, nickel can be plated out of alkaline solutions, using polyphosphates and ammonia among the inorganic complexing agents, and various hydroxy-acids, dibasic acids, alpha-amino acids, and amines among the organic complexing agents. EDTA alone is not promising, nor should caustic or cyanide baths be considered. Use of the Ni^+ ion is not recommended either.

VII. APPLICATIONS

We will next review briefly some existing data on alkaline nickel plating solutions, as applied in practice.

Ammoniacal Baths

It is evident from the above that it is easy to obtain successful depositions from ammoniacal solutions, and indeed, most published data deal with such baths. Thus, in his work on the physical properties of nickel deposits performed under AES Research Project No. 9, Brenner[22] included an ammoniacal bath for comparison purposes. This bath consisted of nickel salts added in the same proportions as in a Watts bath, but with ammonia instead of boric acid for *p*H adjustment. The formula is:

$NiSO_4 \cdot 7H_2O$	240 g/l
$NiCl_2 \cdot 6H_2O$	60 g/l
$(NH_4)_2SO_4$	50 g/l
*p*H (adjust with NH_3)	8.5
Temp. (°C)	25–80
Current density (asf)	20–100

Presumably, to minimize ammonia fuming, it would be preferable to operate at the lower end of the temperature range. Hard, lustrous, brittle deposits were obtained.

Another example of an ammoniacal bath is one reported by Izgaryshev et al,[23] which produces lustrous, hard, but stressed deposits at relatively low current densities:

$NiSO_4 \cdot 6H_2O$	400 g/l
$(NH_4)_2SO_4$	20 g/l
KCl	10 g/l
NH_4OH (25%)	250 ml/l
*p*H	8 or more
Temp. (°C)	20–35
Current density (asf)	5–15

It was found necessary to include some chloride in order to insure adequate corrosion of the anode.

Ammoniacal-Polyphosphate Baths

The Zialite bath is designed to permit the direct plating of nickel upon zinc. Thus, the solution must be highly complexed to prevent the nickel from displacing on the zinc. The bath is kept alkaline also to provide for good covering and throwing power. Of the complexing agents discussed above, this bath uses ammonia, polyphosphates, and citrates. Since the term "Zialite" is a proprietary name, the formulation which it currently represents is not known; but a patent granted to Tuttle[24] indicates the type of solution employed:

$NiSO_4 \cdot 6H_2O$	120 g/l
$Na_4P_2O_7 \cdot 10H_2O$ (pyrophosphate)	65 g/l
$NaHSO_3$ (bisulfite)	2 g/l
$2Na_3C_6H_5O_7 \cdot 11H_2O$ (citrate)	60 g/l
$C_6H_8O_7$ (citric acid)	15 g/l
NaCl	30 g/l
NH_4OH (28%)	30–60 g/l
*p*H	7.5–9.0
Temp. (°C)	20–35
Current density (asf)	2–20

The pyrophosphate not only complexes nickel, but probably acts also to reduce the dissolution of zinc by formation of insoluble zinc phosphate coatings, while the citrate acts to complex the nickel in solution, thereby also reducing the tendency to form displacement coatings. Citrate may also act as a buffer. The bisulfite improves the throwing power, while the ammonia not only complexes nickel, but serves to adjust *p*H to the desired level.

Organic Complex Baths

Work on such baths was first stimulated by a search for suitable baths for plating nickel on zinc. Thompson[25] and Nichols[26] made a study of cathode polarization, and concluded that organic hydroxyacids such as citrates, tartrates, and lactates are suitable complexing agents. They developed a number of baths, operated, however, under slightly acid conditions. Likewise, Rogge and Roehl[27] plated thick ductile coatings of nickel directly upon zinc from a tartrate solution, though again, the *p*H was slightly acid. Their bath is:

$NiCl_2 \cdot 6H_2O$	20–40 g/l
$C_4H_6O_6$ (tartaric acid)	30–60 g/l
*p*H (adjust with NH_3)	5.3–6.2
Temp. (°C)	40
Current density (asf)	10–90

More recently, an alkaline organic complex bath has been brought out by Du Rose et al:[28]

	Bath No. 1	Bath No. 2
$NiSO_4 \cdot 6H_2O$	100 g/l	.....
$NiCl_2 \cdot 6H_2O$	.....	85 g/l
$Ni(NO_3)_2$	20 g/l	20 g/l
NH_4Cl or NaCl	35 g/l	.....
Na_2SO_4	.....	75 g/l
$NaHSO_3$	5 g/l	5 g/l
$2Na_3C_6H_5O_7 \cdot 11H_2O$ (citrate)	66 g/l	66 g/l
$N(CH_2)_2N \cdot (CH_2COOH)_4$ (EDTA)	60 g/l	40 g/l
$N(CH_2 \cdot CH_2OH)_3$ (triethanol-amine)	40 ml/l	40 ml/l
*p*H (adjust with NaOH)	7 (6.5–12)	7.5
Temp. (°C)	60	60
Current density (asf)	40	40

In these two formulas, the sulfate acts as the main source of nickel, chloride promotes anode corrosion and improves conductivity, ammonium salts improve luster, and ductility, nitrate represses hydrogen evolution, permitting higher current densities, bisulfite improves throwing power, citrate acts

as a complexing agent and buffer, EDTA and triethanolamine act as complexing agents.

Alkaline Electroless Nickel Bath for Electroplating

Some years ago, Brenner and Riddell[29] discussed an alkaline electroless nickel plating solution, which was more recently modified by Sullivan and Eigler[30] for plating on semiconductors. The writer, in light of the above calculations, decided to use this bath for alkaline nickel plating, by eliminating the reducing agent (hypophosphite) and using current instead. The following formula was employed:

$NiCl_2 \cdot 6H_2O$	30 g/l
NH_4Cl	50 g/l
$(NH_4)_2HC_6H_5O_7$ (citrate)	65 g/l
NH_4OH (30%)	175 ml/l
*p*H (color)	9.0–9.2
Temp. (°C)	25
Current density (asf)	30

When deposits from the above bath were plated directly upon steel, adhesion was poor, and extensive peeling occurred. A copper flash from a cyanide strike circumvented this, and permitted thick (up to 25 mil) deposits to be obtained. These thick deposits were light gray, matte and smooth (except for slight nodules resulting from the fact that the nickel anodes were not bagged). Above 30 asf, the deposit darkens in color, although burning is not observed on thin deposits up to 100 asf.

Initial cathode current efficiency was 72 per cent, and anode current efficiency (5:1 anode to cathode area ratio) was 105 per cent. After passage of 50/amp-hr/gal during a one week period of time, the respective efficiencies were 65 and 92 per cent. After one week, it was found necessary to add about 1/3 of the original ammonia content. No adjustment was made for the rise in nickel content of the bath.

In the above bath: the nickel ion supplies the source of the metal to be plated, the ammonium ion provides a suitable complexing agent for nickel, the chloride ion permits rapid anode dissolution, the citrate ion assists in complexing of nickel and also aids in buffering the solution at the desired *p*H, the hydroxide ion provides the desired *p*H. It will be noted that cathode efficiencies are too low to be commercially interesting, but this should be easy to correct by increasing the metal content.

The above examples are not meant to be exhaustive, but rather to illustrate how the principles laid down in the earlier sections of the paper may be employed to produce nickel deposits from alkaline solutions. It is equally clear that much further work remains to be done. In particular, work needs to be done on development of suitable means of stress reduction, possibly through use of organic addition agents.

ACKNOWLEDGMENT

The author appreciates the help of Edward Bulan who did the experimental work, and of Edwin Bowerman Jr., who made some helpful suggestions.

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RESEARCH ON MICROTHROWING POWER AND LEVELING OF PLATING BATHS

by DR. ERNST RAUB*

MICROTHROWING POWER AND LEVELING in recent years have been of increasing interest to the plating industry. Several months ago E. B. Leffler and H. Leidheiser[1] under the sponsorship of the AES Project No. 17 published a survey of the literature on the subject. In the last year the two important papers of D. G. Foulke and O. Kardos[2] and O. Kardos[3] have appeared. The survey of Leffler and Leidheiser is a careful, comprehensive account of the literature in which all essential points are considered. The recently appeared researches of J. D. Thomas[4] and S. A. Watson and J. Edwards[5] are particularly noteworthy.

According to D. G. Foulke and O. Kardos[2] and O. Kardos[3] the characteristic features of normal or macrothrowing power occur on macroprofiles which are enveloped by an essentially uniformly thick diffusion layer, with the exceptions of certain edges or with certain stirring arrangements. On microprofiles, however, the diffusion layer on the peaks is thinner than in the hollows. If there is a strong influence of the thickness of the diffusion layer on the polarization, a change in the current distribution results. If the polarization increases with the thickness of the diffusion layer, the current is raised at the peaks. The result is normally a poor microthrowing power. On the contrary if the polarization decreases with increasing thickness of the diffusion layer, the current is concentrated in the hollows and leveling is expected. If the polarization is not affected by the thickness of the diffusion layer, good microthrowing power is to be expected since the current density to the elevations and depressions is equal.

In baths in which the discharge of the metal occurs with high concentration polarization, the latter increases strongly with the thickness of the diffusion layer. This is the case with plating baths in which the concentration of the depositable ions or molecules is very small, as in the cyanide copper bath. The mechanism of the deposition of copper from the cyanide electrolyte is not yet clear. Surely the deposition does not occur from the complex ion, $[Cu(CN)_4]^{3-}$ which prevails in the bath.

According to the researches of A. Höing[6] and G. Grube[7], copper deposits from the unstable complex ion, $[Cu(CN)_2]^-$ practically reversibly, that is without polarization. It is not improbable that the discharge of the copper occurs from the ion, $[Cu(CN)_2]^-$, which occurs in the copper bath in a very small concentration. In this manner the high concentration polarization of the cyanide copper bath may be explained.

In acid copper baths and in the Watts nickel bath the concentration of depositable ions is large, and consequently the concentration polarization is small. An influence of the thickness of the diffusion layer upon the polarization, therefore, is not to be expected in the deposition of nickel and copper from acid baths. In agreement with this, a better metal distribution was found in the pores of a surface either copper[8] or nickel[9] plated in acid baths than by copper plating in a cyanide bath. Also, C. E. Reinhardt[10] found that microthrowing power increased with the nickel ion concentration of the Watts bath.

The effect of leveling addition agents in bright nickel baths is a result of the agents being present in a higher concentration on peaks than in depressions. This occurs because of the smaller thickness of the diffusion layer on the peaks, which is to be expected. The higher concentration of the leveling agent causes an increase in polarization and the current flow is consequently diverted from the points to the depths where thus a thicker coating is deposited.[1, 2, 5]

Through microscopic examination it was confirmed several times that deposits from nickel baths containing leveling agents have distinct lamellae on the projections of microprofiles in consequence of the periodic rhythmic inclusion of the leveling agent. The laminations were lacking in the depth of the depressions.

Our present investigations ought to further the understanding of microthrowing power. The characteristic features of microthrowing power should also occur on macroprofiles, if on certain areas of the surface the convection of the liquid is so strongly restricted that an appreciable increase in the thickness of the diffusion layer occurs. In order to investigate these influences on macroprofiles, cylindrical test pieces closed at one end as shown in Fig. 1 were used. The metal distribution of electrodeposited nickel and copper was examined. The inner diameters of the hollows varied from 3 to 24 mm, the depth from 6 to 24 mm.

Furthermore, for the investigation of the influence of the shape of the surface profile on the microthrowing power, the metal distribution of copper and nickel deposits was studied on plates having V-shaped notches. The angle of the latter varied from 30° to 120°. The depth of the notches ranged from 0.1 to 0.14 mm. Finally, shapes with irregular U-shaped notches were used in the investigation of the distribution of nickel and copper coatings.

On the shapes shown in Fig. 1, the convection of the liquid is decreased with decreasing diameter and increasing depth of the cylindrical depression and thereby the thickness of the diffusion layer will increase opposite to the surface of the outer band of the forms where convection is unhindered. The experiments were done in both stirred and quiescent baths.

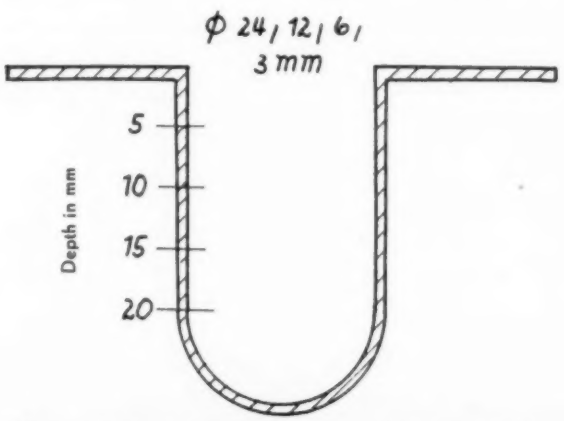

Fig. 1. Schematic diagram of the cavity used for examining the distribution of electrodeposited coatings.

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For the nickel plating a good leveling nickel bath of proprietary composition and a Watts bath without additions were used. The composition of the latter was:

Nickel sulfate ($NiSO_4 \cdot 7H_2O$)	240 g/l
Potassium chloride	20 g/l
Boric acid	30 g/l

In both baths the concentration of dischargeable ions is large, so that no significant influence upon the distribution of the nickel deposit is to be expected as a result of the increase in the thickness of the diffusion layer with decreasing convection in the shapes with small diameter. Large differences in the concentration of the leveling brighteners could not occur with these cylindrical hollows. Therefore, the differences in the distribution of nickel obtained with the two nickel baths should correspond only to their clearly different macrothrowing powers. The experiments were carried out at a bath temperature of 55C and with a cathodic current density of 3 to 5 amp/dm². The average thickness of the nickel coatings was between 10 and 40 microns (0.4 to 1.6 mils).

The cyanide copper bath had the following composition:

Copper	50 g/l
Potassium Cyanide, free	7 g/l
Sodium carbonate	30 g/l

The thickness of the copper deposit ranged between 10 and 30 microns (0.4 to 1.2 mils). The temperature of the bath was 50C, the cathodic current density in the agitated electrolyte was 3 amp/dm², in the quiescent bath, 1 amp/dm².

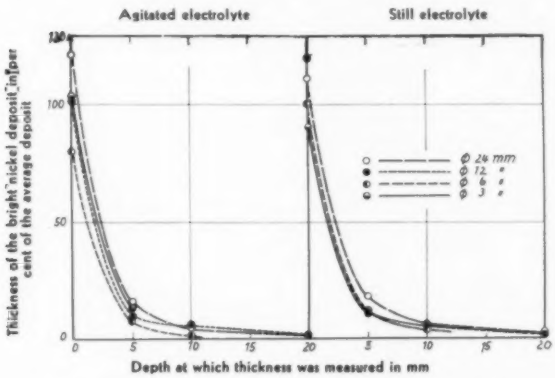
Agitated electrolyte
Still electrolyte
Thickness of the bright nickel deposit in per cent of the average deposit
Depth at which thickness was measured in mm
Ø 24 mm
12 "
6 "
3 "

Fig. 2. Distribution of a bright nickel deposit in cylindrical cavities with one side closed and of various diameters.

The essential results of the experiments with the hollow cylinders are given in Figs. 2, 3 and 4. These figures give the thickness of the electrodeposit in the cylindrical hollow as a function of the depth, that is the distance of the point of measurement from the inner edge of the depression.

Figs. 2 and 3 show for both bright and matte nickel deposits a distribution of the coating within the hole that is almost independent of the diameter of the hole. The somewhat smaller macrothrowing power of the bright nickel bath as compared with the Watts nickel bath is clearly shown in the curves of Figs. 2 and 3. The influence of the movement of the bath upon the distribution of the nickel deposit is small, as is to be expected with baths having high concentrations of dischargeable ions.

It should be kept in mind that the throwing power of the nickel baths is weak in cylindrical depressions of the size discussed. Therefore differences in the throwing power between stirred and quiescent electrolytes are not very distinct at the bottom of the depressions because the movement of the fluid

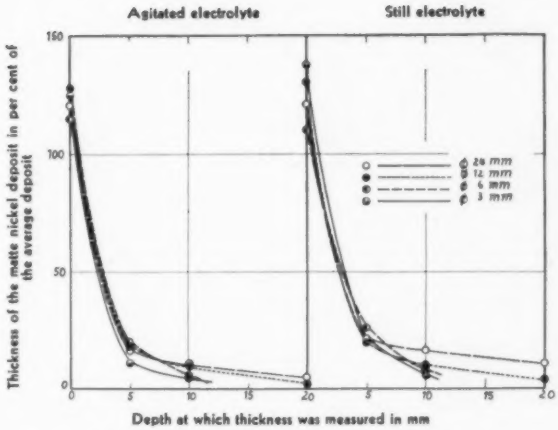
Agitated electrolyte
Still electrolyte
Thickness of the matte nickel deposit in per cent of the average deposit
Depth at which thickness was measured in mm
Ø 24 mm
12 mm
6 mm
3 mm

Fig. 3. Distribution of matte nickel deposits in cylindrical cavities with one side closed, and of various diameters.

will be slowest there. But in the upper part of the depressions where the movement of the electrolyte is still high, no marked difference is noticeable in the thickness of the nickel deposits between stirred and quiescent electrolytes.

Essentially different from these is the distribution of the copper deposit from the cyanide bath. With forms having an inside diameter ranging from 24 to 6 mm, the distribution of the copper deposit in the depths of the form, was either independent of, or only slightly dependent on the diameter of the cylinder as shown in Fig. 4. This relation is similar to that found for the nickel deposits. The main difference with respect to the nickel deposits was the well-known good macrothrowing power of the cyanide copper bath. Furthermore, the figure shows the effect of the movement of the bath on the distribution of the copper deposit, which is to be expected with baths having a high concentration polarization.*

In quiescent baths the distribution of the copper deposits

*In the described experiments the current density of the quiescent bath was less then that of the stirred bath. It would be better to make comparisons with the same current density. Investigations in this direction are in progress. But it is not to be expected that the differences observed between stirred and quiescent copper-cyanide baths are strongly influenced by the different current density, although a certain influence is not denied.

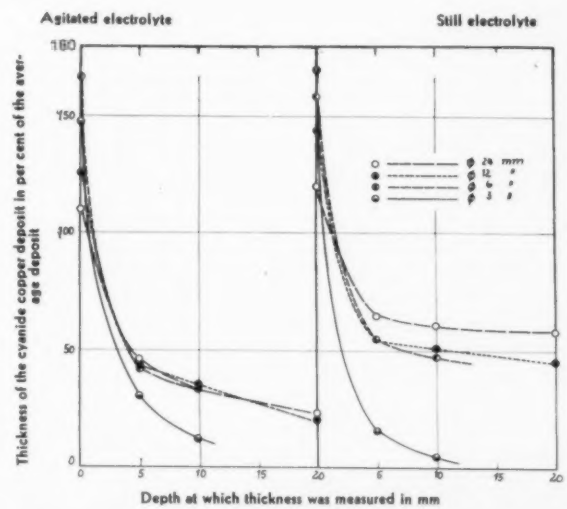
Agitated electrolyte
Still electrolyte
Thickness of the cyanide copper deposit in per cent of the average deposit
Depth at which thickness was measured in mm
Ø 24 mm
12 "
6 "
3 "

Fig. 4. Distribution of a copper deposit from a cyanide copper bath in cylindrical cavities, one side closed, of various diameters.

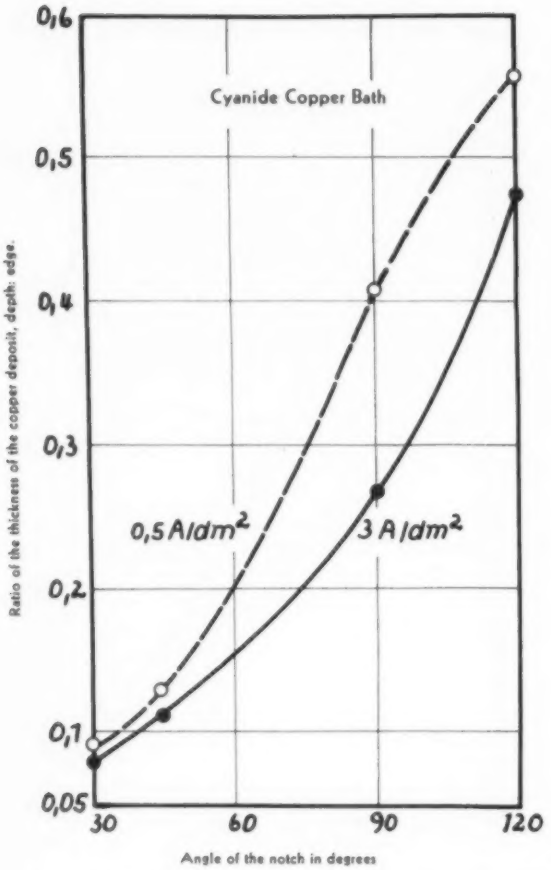

Fig. 5. Variation of the microthrowing power of a cyanide copper bath with the angle of the v-shaped notch. Deposits 40 microns (1.5 mils) thick.

was considerably more uniform than in agitated baths. With cylindrical holes having a diameter of opening of 3 mm the better throwing power of the cyanide copper bath, as compared with that of the nickel baths, was no longer evident. The corresponding curves in Fig. 4 show a very strong decrease in the thickness of the copper deposit with increasing depth, which is at least equal to that of the nickel baths, as shown in Figs. 2 and 3. Moreover, with the forms having a diameter of 3 mm, the familiar dependency on the movement of the bath no longer occurs. One observes, rather, that the decrease in the thickness of the copper deposit in the unagitated bath is greater than in the agitated bath.

With holes closed on one end and provided with such a narrow opening that the convection is considerably restricted, the cyanide copper bath shows not only a poor throwing power, but also a reversal of the normal dependency of the macrothrowing power on the movement of the bath.

The strong repression of the convection of the liquid in the narrow hollows is the cause of the occurrence of thicker diffusion layers. With nickel baths having high concentrations of dischargeable ions and consequently small concentration polarization this does not have a significant influence on the metal distribution as long as the current densities are not too high. In copper cyanide baths having small concentrations of dischargeable ions and a high concentration polarization, the migration of the dischargeable ions to the cathode is very strongly hindered by an increase in the thickness of the diffusion layer. Consequently, the deposition potential climbs. This results in the distribution of the copper deposit showing—as in the above case of the hollows of 3 mm diameter—the characteristic features of microthrowing power, even with macroprofiles.

As is to be expected, there exists between micro- and macrothrowing power a fluid transition, and in plating no sharp boundary can be drawn between the two. In an electrolyte with a small concentration of dischargeable ions or molecules any strong local repression of liquid convection, even with macroprofiles, leads to the characteristic condition of the microthrowing power. This occurs because the thick diffusion layer which forms in the depths of the profile suffices to so increase the concentration polarization that the metal deposition is strongly hindered.

The influence of the shape of the microprofile upon the

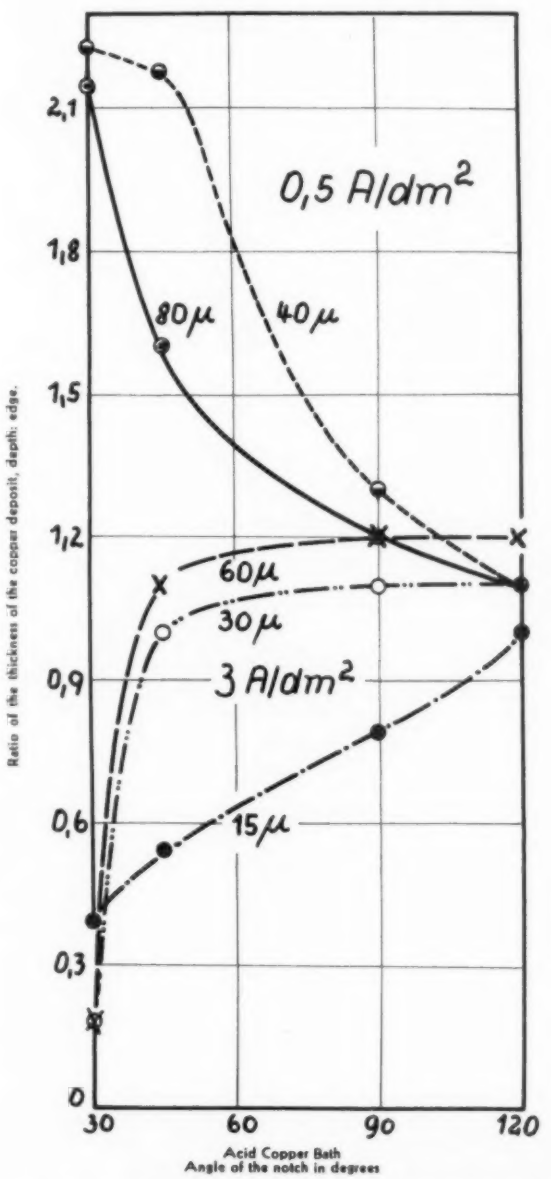

Fig. 6. The microthrowing power of the copper sulfate bath in V-shaped notches.

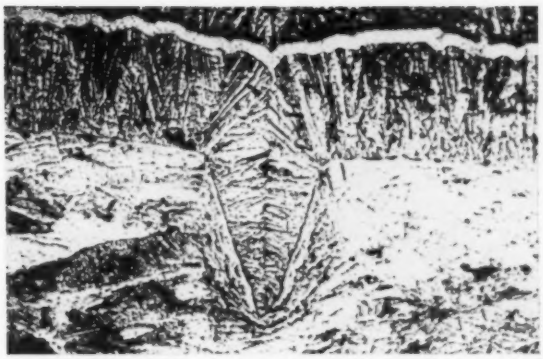

Fig. 7. Structure of a copper deposit with positive leveling obtained from a copper sulfate bath at a current density of 0.5 amp/dm². Average thickness of deposit, 80 microns (3 mils). Depth of notch, 0.12 mm. Angle of notch, 30°. ×200.

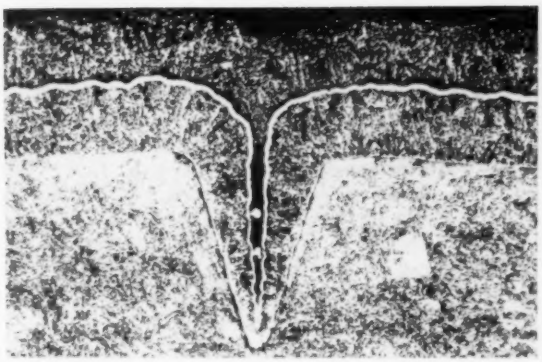

Fig. 8. Structure of a copper deposit with negative leveling obtained from a copper sulfate bath at a current density of 3 amp/dm². Average thickness of the copper layer, 50 microns (2 mils). Depth of notch, 0.14 mm. Angle of notch, 30°. ×200.

microthrowing power and leveling has been studied several times.[1] For the following research performed on brass panels with V-shaped notches, a Watts bath was used containing the sodium salt of alpha-naphthalene sulfonic acid, which is known to exert no leveling action. This bath was used in addition to the above discussed cyanide copper and the nickel baths. A copper sulfate bath of the following composition was also used.

Copper sulfate	250 g/l
Sulfuric acid	49 g/l

The measurement of the thickness of the deposit in the V-notch disclosed characteristic differences which are shown in Figs. 5, 6 and 7. These figures give the ratio of the thickness of the deposit in the depth to that on the edge as a function of the angle of the notch. The data are for equal depths and for the same average thickness of the deposit.

With copper deposition from a cyanide bath, Fig. 5, the thickness of the coating in the depth having an angle of 30° was only about 10 per cent of the deposit on the edge. With increasing angle the distribution of the copper deposit became more uniform. At an angle of 120° the deposit attained about 50 per cent of the thickness of the deposit on the edge. The influence of current density was relatively small. The curves for copper deposits produced at 0.5 and 3.0 amp/dm² do not have the same values, but the differences in the trends of the curves are not significant.

The acid copper bath (Fig. 6) shows an entirely different behavior. At a cathodic current density of 0.5 amp/dm² a significant leveling is observable with coatings 40 and 80 microns thick on indentations of small angles. The thickness of the copper deposit at the deepest point of a 30 degree notch was twice as thick as at the edge. With increasing size of the angle of the notch, the ratio decreases rapidly, so that in a 120° notch the thickness of coating in the depression and upon the edge of the notch are practically equal.

At a current density of 3 amp/dm² one observes the opposite relation of the thicknesses. With notches of small angle a considerable negative leveling occurred, that is the deposit upon the edge of the V-shaped notch of the specimen was essentially thicker than that in the depression. The negative leveling is, however, always less than that of the cyanide copper bath. With increasing angle of the notch, the ratio of the thicknesses of the deposits under the chosen research conditions increases so fast, particularly for the thicker deposits of 30 and 60 microns, that it exceeds 1, and the thickness of the deposit in the depression becomes greater than that on the outside surface.

The microscopic examination of the deposits of the copper plated specimens yields an explanation for these characteristic differences in the influence of the current density. Fig. 7 shows a copper deposit having an average thickness of 80 microns which was formed upon a 30-degree notch at a cathodic current density of 0.5 amp/dm². The copper deposit exhibits a distinct oriented growth. The direction of growth of the crystals lies in the direction of the lines of current flow. The filling up of the notch in the brass plate proceeds in this manner. The crystallites grow out from the sides of the V-shaped notch with a strongly preferred direction, that of the lines of current flow (Note: which are perpendicular to the sides of the notch), until they meet together in the center of the notch. One can recognize in the illustration the sharp seam of separation which forms where the crystallites growing from the two sides meet each other. One observes phenomena similar to that shown in Fig. 7 in the production of molds for the phonograph industry by copper plating. For comparison Fig. 8 shows a deposit, thickness 50 microns, which was produced in the same bath, but at a current density of 3 amp/dm². Under these conditions of electrolysis the field-oriented growth of the crystallites has been very much weaker. The crystallites to a large extent have grown unoriented so that the closing of the notch could not occur as with the field-oriented crystal growth. As shown in Fig. 8, the thickness of the copper deposit on the upper zone of the notch has grown more quickly than in the depression, so that the original V-shaped notch has taken the form of a narrow slit and has not completely closed.

The leveling of the acid copper bath without addition agents has its origin in the field-oriented crystal growth, according to H. Fischer.[11] It leads so much more rapidly to a stronger leveling, the more sharply the crystallites which grow out from the sidewalls are oriented in the lines of current flow and the smaller the angle of the notch. At an angle larger than 120° no positive leveling occurs. If the electrolysis occurs under conditions which for the most part lead to unoriented crystallization, then with small angles the notch only becomes narrower.

The relation between leveling and crystal growth shown by microscopical investigations cannot be fully explained by the experimental results described here. Further investigations are necessary.

With the acid copper bath, it is not a case of leveling in the narrow sense that it is one due to a concentration of current flow lines in the depths of the notch. The current density upon the side walls of the notch is by no means higher, but rather lower than that upon the plane surface of the plate. The rate of deposit thickness increases upon the side walls of the notch and does not exceed that upon the upper surface of the panel. Were the leveling that occurs in copper plating in the acid bath at a current density of 0.5 amp/dm² caused by a forcing of the current lines into the depths of the notch, then the ratio of the thickness of the deposit in the depression to that on the edge would be greater and at an angle of 120° would not yet have decreased to 1.

Fig. 9 shows the experimental results on the distribution of the nickel deposits. With a proprietary bright nickel bath of very strong leveling properties one observes a strong dependency of the leveling on the current density. Moreover, there is a strong decrease of the thickness ratio of the nickel deposits with increasing angle. The value of the ratio is very much higher than with deposits out of the acid copper bath.

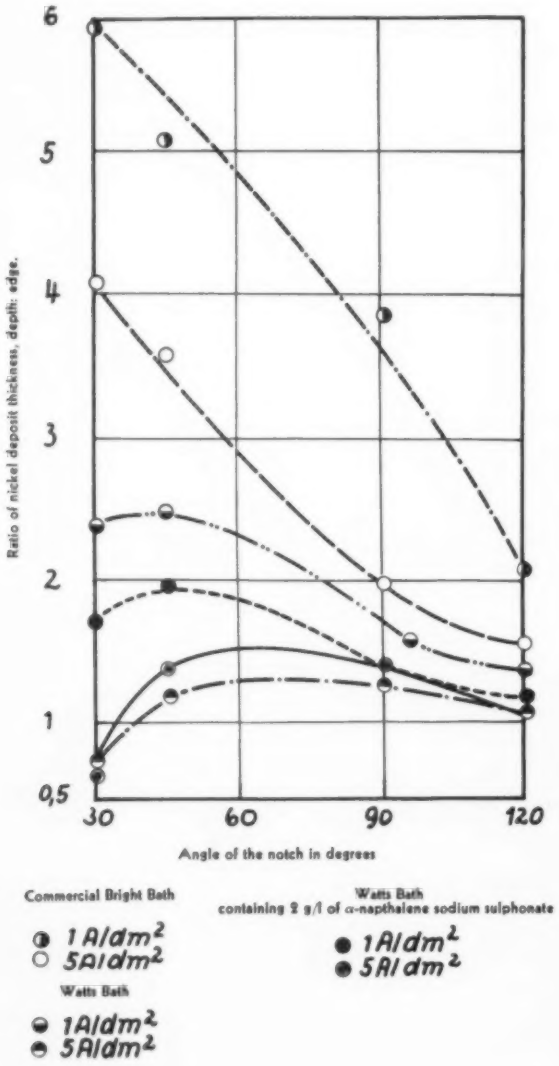

Fig. 9. Microthrowing power and leveling of nickel baths in V-shaped notches of various angles.

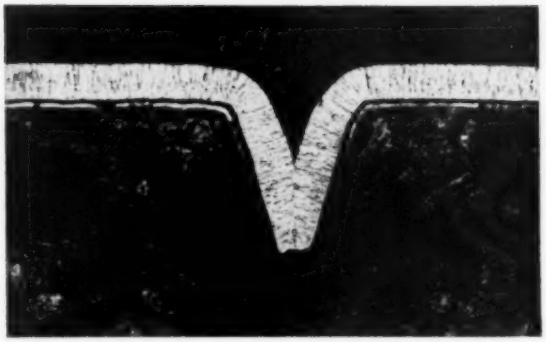

Fig. 10. Structure of a matte nickel coating deposited from an unagitated Watts bath, free of addition agent, at a current density of 1 amp/dm². Average thickness of deposit, 30 microns. Depth of notch, 0.12 mm. Angle of notch, 30°. ×200.

The Watts nickel bath operated at 1 amp/dm² shows a considerable leveling with small angles with a small increase between 30 and 45°. With larger angles there occurs a decline. The thickness ratio of the nickel deposits obtained at 5 A/dm² from a Watts bath containing 2 g/l of sodium alphanaphthalene sulfonate is less than 1 with a 30° angle, increases with the angle to something greater than 1, and slowly decreases with angles larger than 90°.

With nickel deposits from a Watts bath containing no addition agent, the ratios correspond about to those of the copper deposits obtained from the acid bath at 0.5 amp/dm², although the dependency on the angle shows a somewhat different course.

The structure of the nickel deposits out of the addition-free Watts bath (Fig. 10) shows likewise a crystal growth distinctly oriented in the direction of the current lines. One sees likewise, as with the copper deposit in Fig. 7, the sharp boundary line where the crystals growing out from the sidewalls of the notch meet. Thus, with the dull nickel bath under the chosen conditions of investigation there is no genuine leveling in the sense of a forcing of the current lines into the depths and an increased discharge of metal per unit area. The leveling of the dull nickel bath has the same cause as that of the acid copper bath.

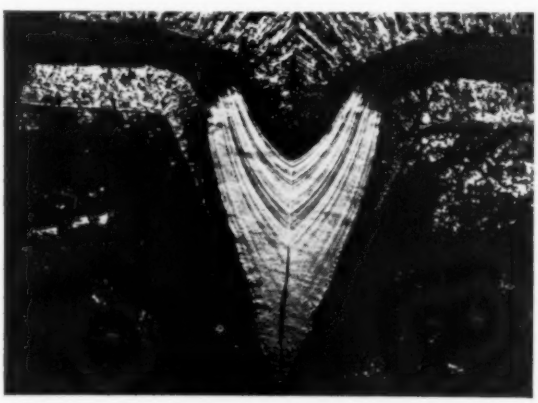

Fig. 11. Structure of a bright nickel coating deposited from an unagitated bath at a current density of 1 amp/dm². Average thickness of deposit, 20 microns. Depth of notch, 0.12 mm. Angle of notch, 30°. ×500.

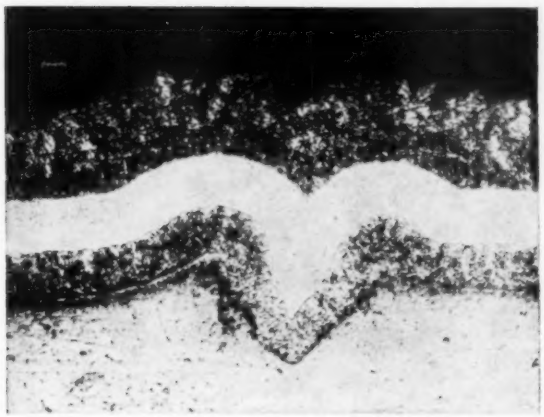

Fig. 12. U-shaped notch in a brass panel copper plated in an acid bath and then nickel plated in a Watts bath. Angle of the notch, 90°. ×500.

Fig. 11 reproduces a nickel deposit from a bright nickel bath. In order to correctly etch the nickel deposit in the depth of the notch, the deposit upon the plane surface, containing more co-deposited foreign material, had to be overetched so that it appears black in the photomicrograph. The picture is in its characteristics similar to the photographs published by other investigators, for example, D. G. Foulke and O. Kardos. One recognized the weakness or lack of lamellation in the depths of the notch in consequence of the smaller inclusion of brightener or leveling agent at these places. In the upper parts the inclusion of foreign matter is greater, as can be recognized by the sharper lamellae. It is interesting that also in this picture occurs the characteristic, distinct center line which is the boundary line of the meeting of the crystallites that grow out from the sidewalls. In the lower part of the picture of the notch one recognizes a distinct, elongated void at the boundary.

In Fig. 11 no field-oriented crystal structure is seen on the bottom of the notch. This is contrary to the results published by D. G. Foulke and O. Kardos as shown in Fig. 3 of their paper. This difference is not only due to the different composition of the used baths, but also to the quite different form of the notch.

With the above discussed bright nickel bath, in contrast to the acid copper bath and the Watts bath, one can speak of a genuine leveling in the sense of a more rapid growth of the deposit in the depression than upon the plane surface. The thickness of the deposit, measured perpendicular to each lateral surface of the notch, is more than double the thickness of the deposit upon the plane surface. Also in this bright nickel bath the growth of the deposit proceeds from the lateral surfaces of the notch. At the deepest point the thickness is small. The increased growth rate on the middle part of the side surface of the angular notch has led to a closing-in and growing-over of a narrow void in the lower part of the notch. Apart from this, the coating from the commercial bright nickel bath shows the typical feature of a genuine leveling with a displacement of current flow lines from the peaks to the depths.

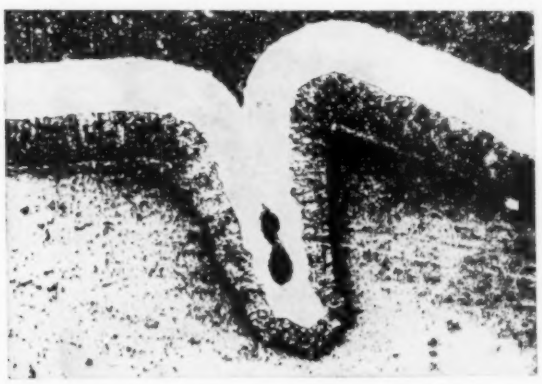

Fig. 13. U-shaped notch in a brass panel copper plated in an acid bath and then nickel plated in a Watts bath. ×500.

The fact that the preferred growth of the crystal fibres in the direction of the current lines was of special significance for microthrowing power and leveling led to the carrying out of researches on the microthrowing power in notches of various irregular forms on the surface of a panel. For these researches there was used the Watts nickel bath, free from addition agents, and the acid and the cyanide copper baths of the above given compositions. Brass containing 63 per cent of copper was used as the basis metal. Figs. 12 and 15 illustrate several observations of polished cross sections of plated brass panels with various types of notches. For the better differentiation of the characteristic features only the copper and the brass of the cross section was etched. Fig. 12 shows copper and nickel plating in a notch which has approximately a V-shape and a 90° angle. By means of the copper plating which was done first the angle was decreased to 45°. The subsequently deposited nickel coating has the characteristic features shown in Fig. 10. The thickness ratio of the deposit in the depth to that on the surface is 2.2. The crystallites which have grown out from the side walls have closely grown together, because of the regular form of the notch, without leaving a visible void. Also in this case, the thickness of growth of the nickel deposit upon the side walls of the notch is not greater than upon the plane surface of the copper plated panel.

Fig. 13 shows a brass panel with a relatively smaller, more U-shaped, somewhat irregular notch, which was copper plated in the acid bath and nickel plated in the same manner as the V-shaped notch shown in Fig. 12. Nickel plating did not completely close the notch. One observes in the lower part of the cavity a void which is constricted in the middle. The void produced by the notch is thus partly overgrown by the nickel deposit. The constriction of the remaining void lies opposite two plainly visible points of the copper deposit, on which an accelerated growth of the nickel deposit has occurred.

Figs. 14 and 15 show two irregular U-shaped notches in brass panels. They were plated with cyanide copper and finally in the Watts nickel bath. One can observe the much poorer microthrowing power of the cyanide copper bath in comparison with the acid bath. By the cyanide copper plating the notch was deepened and made narrower at the edge. In the subsequent nickel plating in the Watts bath the notches have grown from the upper edges inward, while on the inner walls relatively little nickel has deposited prior to the complete closing. The thickness of the nickel layer in the notch has remained relatively small. In this manner there is produced from the notches a large void overgrown by the nickel coating.

Thus occurs the formation of the so-called concealed or masked pores and voids, much feared in practical electrodeposition. The formation of the masked pores accordingly is to be attributed to the increased growth of the metal coating

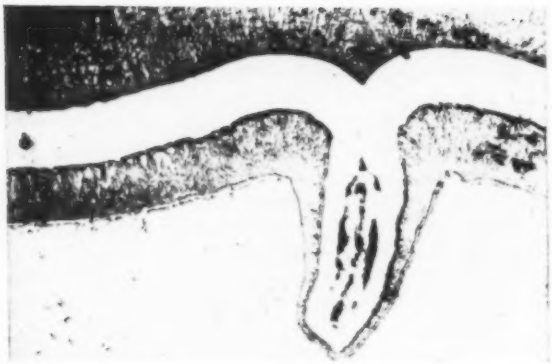

Fig. 14

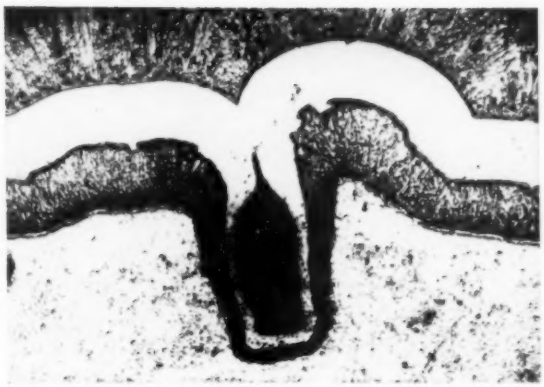

Fig. 15

Irregular U-shaped notches copper plated in the cyanide bath and then nickel plated in the Watts bath. ×500.

in the direction of the current lines, on the side walls of the upper part of the neck of the pore. Thus a positive leveling is simulated.

SUMMARY

Investigations on the nickel and copper plating of various macro- and microprofiles on brass panels lead to the following results.

1. Between macro- and microthrowing power there is a fluid transition. In copper plating from a cyanide bath the characteristic features of microthrowing power show themselves also on macroprofiles if the form of the latter is such as to strongly repress convection of the electrolyte so that in the depths a thick diffusion layer forms.

2. Leveling in the realm of microthrowing power occurs with coatings from the copper sulfate bath and the Watts nickel bath, free from addition agents, as a result of the definite field-oriented type of crystal growth upon the metal crystallizing upon the sides of the microprofiles.

It was shown that in V-shaped notches in a surface positive leveling in general does not occur with a random type of thickness growth. In no case does a concentration of the lines of current flow into the depths of the microprofiles occur with these baths. The cathodic current density in the notches does not exceed the average current density upon the surface. It is even occasionally smaller. Accordingly there is in no case a greater thickness growth upon the sides of the notch than upon the plane surface.

3. Genuine leveling in the sense of a forcing of the current lines into the depths of the profile occurs with bright nickel plating baths containing leveling agents. In this case there occurs a considerably accelerated thickness growth upon the lateral surfaces of the microdepressions in comparison with the upper surface of the panel. The above results are in agreement with the interpretations given by various researchers for the leveling of these baths. In genuine leveling field-oriented growth is observable in the profile depths. But even with strongly leveling bright nickel baths the growth of the coating in the lowest region of the profile is weaker than in the middle and upper part, so that a void may be formed which is covered by the deposit.

4. With brass panels provided with various shapes of notches there was shown the formation of the so-called hidden or masked cavities which result from the increased growth of the nickel deposit in the upper part of the microprofile.

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Ernst Raub entered Muenster University in Westphalen, Germany, in 1923, where he majored in chemistry and physics. Dr. Raub received his PhD degree in 1927. He joined the Research Institute for Noble Metals in Schwaebisch Gmuend, Germany, in 1928. Since 1934 he has been director of the institute. He was invited to teach at the Technical College of Stuttgart in 1935, and in 1937 was appointed professor.

MAGNESIUM

AND PROTECTIVE COATINGS

FOR MAGNESIUM

by HARRY A. EVANGELIDES*

A brief history of the production of magnesium from the day of its discovery to the present day development and industrial production and use in the United States. The behavior of magnesium alloys in corrosive atmospheres and types of corrosion are discussed. Early treatments, chemical and anodic, are briefly described and the newly developed coatings, their characteristics, the operating conditions of the new processes and their control are discussed in greater detail. Their value as protective coatings are compared with the more commonly known coatings, chemical and anodic type.

MAGNESIUM, THE LIGHTEST STRUCTURAL METAL, has assumed considerable importance in many industrial fields and especially in the field of aircraft construction and in defense material where lightness is a factor of prime importance. New defense applications are being constantly developed in many fields and particularly in the field of radar equipment, guided missiles and aircraft instruments. The giant portable radar antenna, known as the paraballoon, supported by a tripod and platform assembly is more than 30 feet high. Together the fiberglass cloth balloon antenna and the magnesium foundation weigh 1730 pounds, whereas comparable metal antennas weigh approximately 10,000 pounds.

There are many established military uses for magnesium; the field telephone set, the walkie talkie, binocular bodies, aircraft instrument parts, aircraft wheels, compressor housings, to mention only a few.

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HISTORY OF THE PRODUCTION OF MAGNESIUM[1]

The production of magnesium on a commercial scale was started early in the 20th century at Strassfurt, Germany. It was first produced from magnesium chloride, obtained as a by-product in extracting potash from the large deposits of carnalite ($KCl \cdot MgCl_2 \cdot 6H_2O$) a hydrous chloride of potassium and magnesium. Magnesium metal in an impure state was first reported to have been obtained by Sir Humphrey Davy in 1808 by electrolysis. In 1833, Michael Faraday prepared magnesium by electrolysis of fused anhydrous magnesium chloride. Later in 1852, Robert Bunsen developed an electrolytic cell for this purpose. It was by the use of a modification of Bunsen's electrolytic cell that the German production began and by 1909 it had advanced from the pilot plant stage to limited industrial production and use. In the United States commercial production began in 1915 soon after the imports from Germany were cut off. The General Elec-

tric Company at Schenectady, N. Y., was the first to begin active production of magnesium in the United States. Before 1915, Germany had been the sole supplier of the metal to the world.

During 1916 and 1917, eight different companies operated plants for the production of magnesium in the United States, though not simultaneously. Most of these companies ceased production after World War I, and by 1920, only two companies remained; The Dow Chemical Company and the American Magnesium Corporation, which in 1919 had become a subsidiary of the Aluminum Company of America. In July 1927, the American Magnesium Corporation discontinued production of magnesium and limited its activities to fabrication. This left The Dow Chemical Company the sole producer of primary magnesium in the United States.

Production of magnesium in the United States increased virtually every year after 1921, although until 1939, these increases were small. The demand for magnesium by the allied Powers, resulting from the outbreak of World War II, was intensified by the defense program of the United States, which began in 1940. In 1941 the Government placed magnesium under mandatory priority status and an investigation of all production processes other than the well established electrolytic process was begun. Between 1939 and 1943, 15 plants were built in the United States, of which 13 were constructed by using Government funds. All of the Government owned plants were operated under management contracts with various companies.

In 1944 the Government removed magnesium from priority controls and later in 1944, some of the Government plants were closed. By 1945, the defense plants had been shut down. However, some were left in standby condition. This as in the period of 1927 to 1940, left The Dow Chemical Company again the sole producer of primary magnesium. In 1950, six Government owned plants were reactivated and production started in March 1951.

The chief source of magnesium in the United States is sea water. In Canada and abroad it is produced from dolomite by the ferrosilicon process. Other magnesium sources are magnesite ($MgCO_3$) 47.8 per cent MgO, and Brucite $Mg(OH)_2$ 69 per cent MgO. Before World War I, magnesium was quoted at $1.65 per lb for the imported metal from Germany. After foreign supplies were cut off, prices rose to $5.00 to $6.00 per lb. In 1916, after production in the United States had begun the price dropped to $2.50 to $3.00 per lb. New developments in magnesium steadily decreased the price of magnesium from $5.00 in 1915 to 23 cents per lb in 1942.

IN CORROSIVE ATMOSPHERES

The major problem confronting the users of magnesium has been the protection of magnesium from corrosion. Magnesium being a highly reactive metal will corrode in the presence of corrosive atmospheres. In most cases the type of corrosion that occurs on magnesium surfaces is galvanic corrosion and not due to atmospheric conditions alone. When magnesium is coupled with a dissimilar metal cathodic to magnesium and exposed to a corrosive medium, magnesium will protect the other metal and itself will corrode. In general when two dissimilar metals are coupled and subjected to a corrosive medium, the metal anodic to the other will corrode; the rate of corrosion depending partly on the potential difference existing between the two metals while corrosion is in progress.

Another factor which greatly influences the rate of corrosion is the amount of metallic impurities in magnesium. Impurities such as copper, iron and nickel will form galvanic cells and accelerate corrosion. The effects of metallic impurities on magnesium are exemplified by the following tests conducted at Frankford Arsenal. Magnesium panels from three different lots of AZ31 magnesium alloy, each lot obtained from a different source, were used in the test. All the test panels were given the same electrolytic treatment and subjected to the salt spray test. Results of this test varied widely. The panels containing greater amounts of metallic impurities showed 5 to 10 times more corrosion than the test panels having smaller amounts of impurities.

PROTECTIVE COATINGS FOR MAGNESIUM

A large number of chemical and electrolytic coatings have been developed for the protection of magnesium surfaces. Of the old treatments, the most commonly known will be discussed briefly. The more recently developed electrolytic coatings will be discussed in greater detail. Most of the treatments utilize dichromates as the active ingredient in the formation of the coating.

The Chrome Pickle Treatment

The chrome pickle, or Dow No. 1 treatment was first developed in 1921. It is a simple and short-time treatment; it operates at room temperature and requires ½ to 2 min immersion, depending on the age of the bath. The chrome pickle treatment is a producer's treatment for the protection of magnesium surfaces during storage, or shipment, or during machining. Chrome pickle causes considerable etching, as much as 0.001 in. or more can be removed during treatment. Because of the etching action the chrome pickle can not be applied to machined surfaces.

The Acid Dichromate Treatment

The acid dichromate, or Dow No. 7 treatment causes no appreciable dimensional changes and may be applied to machined surfaces. The treatment consists of two steps, immersion in hydrofluoric acid, or acid fluoride solutions, and boiling in a dichromate solution for 30 min. Close control of the process is essential; it can not be applied to magnesium-manganese and magnesium-cerium alloys. The coating is used only as a base for paint.

The Sealed Chrome Pickle Treatment

The sealed chrome pickle, or Dow No. 10 treatment combines the chrome pickle and the acid dichromate except, the first step of the dichromate treatment is omitted.

The Iridite No. 15 Process

The Iridite No. 15 Process, developed by Allied Research Products, Inc., is a relatively new treatment applied by immersing the parts in a bath at room temperature for a period of ¼ to 2 min depending on the *p*H of the bath. The short treatment time and the ease with which it is applied make this treatment a promising one.

Galvanic Anodize

Galvanic anodize, or Dow No. 9 treatment, developed in 1941, makes use of the relatively high potential difference existing between magnesium and iron. The tank usually provides the cathode. The parts are immersed in a hydrofluoric acid or acid fluoride solution, rinsed and anodized in a bath consisting of a sulfate, dichromate and ammonium hydroxide, until a uniform coating is obtained.

Manodyze Process

The Manodyze process was developed in 1944 by Consolidated Vultee Aircraft Corporation. Direct or alternating current may be used. The bath is made of a silicate, caustic soda and phenol. After the treatment the parts are immersed in a very weak solution of chromic acid at elevated temperatures.

PREPARATION OF PARTS FOR TREATMENT

Cleaning is a very important step in the treatment of magnesium by the chemical processes. All contamination must be removed from the surface; if oil and grease are present in large amounts, they should be removed with solvent or by vapor degreasing. Chlorinated solvents or hydrocarbons may be used. Alkaline cleaners should be used following the degreasing operation.

NEW ELECTROLYTIC COATINGS

For nearly 30 years the magnesium industry depended on the chemical treatments for the protection of magnesium surfaces from corrosion. Most of the chemical treatments form coatings satisfactory as a paint base, and with a suitable organic finish they give a fair degree of protection from corrosion. However, in military equipment a major requirement is that material shall be able to withstand the most severe conditions likely to be encountered.

During the past eight years considerable amount of progress had been made in the development of new treatments for magnesium and especially of new anodic coatings. In May of 1951, the Army Ordnance Corps announced the HAE coating for magnesium. The coating, developed at Frankford Arsenal, consists of a refractory type material and possesses exceptionally high resistance to corrosion and abrasion. The following year the Dow Chemical Company developed the coating known as Dow No. 17. During the same period the Cr-22, a coating produced from a bath soemwhat similar to the Dow No. 17 bath, was developed at Frankford Arsenal.

The Cr-22 Coating

The Cr-22 bath consists of chromic, phosphoric and hydrofluoric acids and sufficient NH_4OH to bring the bath to *p*H 8. The operating conditions are:

Temperature	203F (95C)
Current Density	15 asf a-c
Terminating Voltage	320 v

A post treatment consisting of a 5 to 10-min immersion in a 15 per cent solution of 41Bé sodium silicate (water glass) at about 176F (80C) is used. After immersion in the silicate solution the parts are *allowed to dry without rensing.* However, for good paint adhesion the silicate treatment should be omitted.

Coatings having excellent protective properties can be obtained by this process, if the bath is operated under the conditions described above. Operational difficulties such as formation of small cratered nodules in the coating can be controlled. Formation of nodules in the coating is partly due to very small amounts of alkali metal ions in the bath. These can be avoided by using chemicals free of alkali ions and also by thorough rinsing of the parts after they have been cleaned in the alkali cleaner.

Dow No. 17 Coating

With the Dow No. 17 process either direct or alternating current may be used. The bath consists of ammonium bifluoride, phosphoric acid and sodium dichromate. The operating conditions are:

Temperature	160 to 180F (71 to 82C) (Bath will not operate below 140 F, but can be operated up to the boiling point.)
Current Density	5 to 10 asf (a-c or d-c)
Terminating Voltage	Up to 110 v

The steel tank is made the cathode when direct current is used. Coatings obtained by this process offer considerably more protection from corrosion than the chemical treatments described earlier.

The HAE Process

The bath for the HAE process consists of the fluoride, manganate and hydroxide of potassium, trisodium phosphate and hydrated alumina. All the ingredients are of technical grade; metallic aluminum instead of the difficulty soluble alumina may be used. Increase of the aluminum content of the bath increases the hardness and abrasion resistance of the coating. If potassium manganate is not available, potassium permanganate may be used. Permanganate being unstable in alkaline solutions will be slowly converted to the manganate during the coating operation. This will be made evident by the change in color from the purple of the permanganate to the green color of the manganate. Complete conversion to the manganate will occur when approximately 1.5 sq ft of area per gallon of bath have been coated. Permanganate should be completely dissolved in hot water before it is added to the bath. Conversion of permanganate to manganate can be affected by boiling a concentrated solution of permanganate in a concentrated solution of potassium hydroxide. The operating conditions of the process are:

Temperature	Room temperature
Current Density	18 asf
Terminating Voltage	80 to 85 v (depending on the alloy)

PREPARATION OF WORK FOR TREATMENT

Generally the chrome pickle treatment is applied to castings and other forms of magnesium in order to protect the surface during storage or shipment. The chrome pickle films do not interfere with the application of the HAE coating. If the

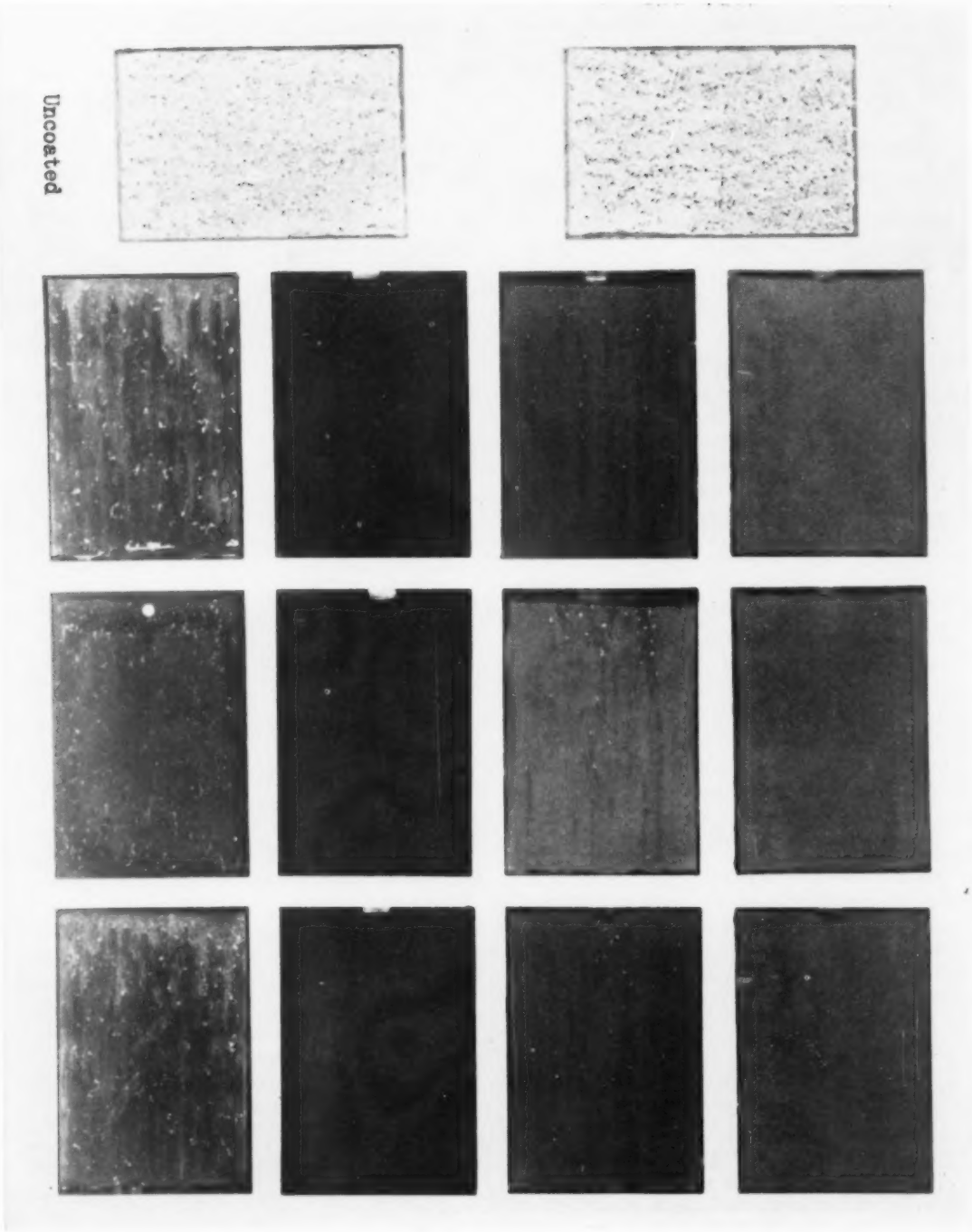

Fig. 1. Appearance of treated FS-1 panels after 96 hours exposure to salt spray

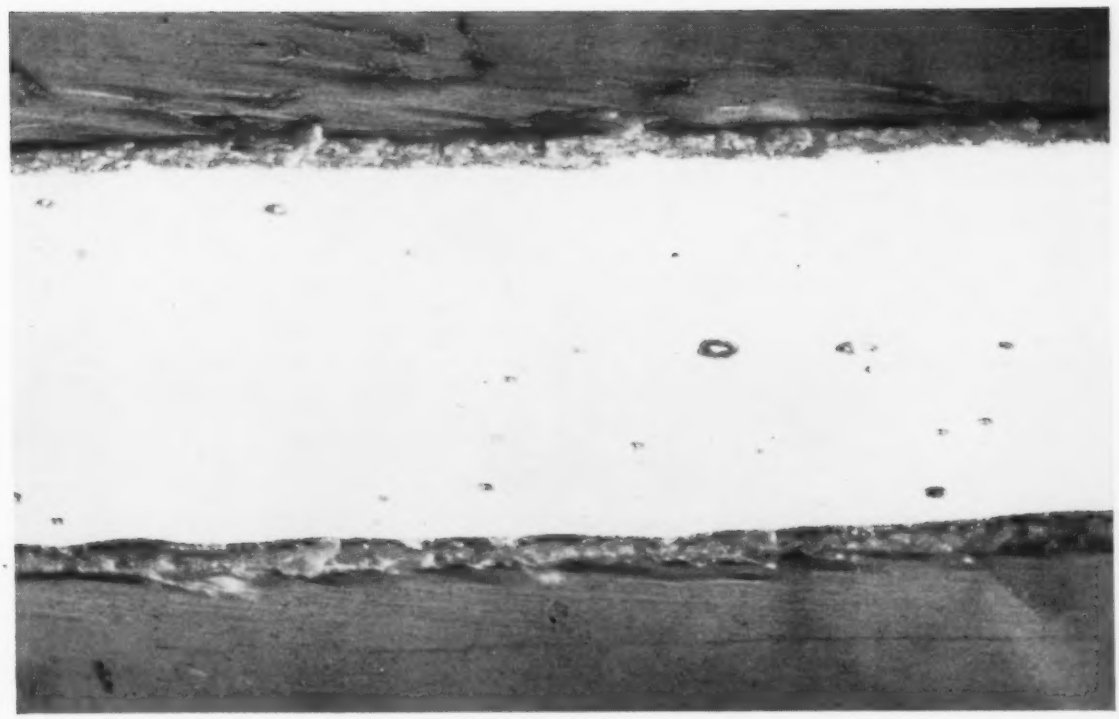

Fig. 2. Bond between the coating and the base metal. X100.

chrome pickled surface is free from oil the parts can be processed without any cleaning treatment.

With alternating current, at least two magnesium parts, each constituting an electrode, must be anodized. The total areas being treated on each electrode should be approximately equal. Electrical contacts with the work and bus bars are made with magnesium rods and should be very firm. Since magnesium is attacked at the solution level, the magnesium leads must be protected with a vinyl type electroplaters' tape. The surface area of all the work and leads submerged in the bath must be considered in computing the required current. Alternating current at 60 cps and at current densities of about 18 asf is used for the HAE process. By increasing the current density the treatment time is reduced. The power is supplied from a variable voltage source. Starting at 0 v, the voltage is quickly raised 40 v or higher and the current adjusted. Within a minute or two the voltage rises to 55 or 60 v. As the coating forms, the resistance to the flow of the current increases. Therefore, the voltage is steadily increased in order to maintain a constant current density.

POST TREATMENTS

There are several types of post treatments which can be applied to the hard-type HAE coating. If the treated parts are to receive a supplemental finish, they are immersed for about 1 min in a dichromate-bifluoride solution and air dried without rinsing. The surface is then ready for paint or other organic finish.

For maximum corrosion resistance or if the parts are to be used without a supplemental organic finish, they are immersed, as before, in the dichromate-bifluoride solution for 1 minute, air dried without rinsing and aged in a humid atmosphere at about 175F (80C) for 7 hr or longer.

Results of corrosion tests conducted at Frankford Arsenal and other industrial laboratories showed that ageing greatly improves the corrosion resistance of the coating. Fig. 1 shows the results of 96 hr exposure to salt spray, compared with other chemical and anodic treatments. The outstanding characteristic of the coating is the fact that its corrosion resistance will continue to improve with time.

Microscopic examination at 100 magnifications, Fig. 2, shows the excellent bond between the HAE coating and the magnesium surface; no voids can be seen. The uneveness of the interface between the base material and the coating indicates a chemical reaction between the magnesium surface and the bath electrolyte.

The coating will abrade steel of Rockwell C-65 hardness. An interesting application of the HAE coating, where abrasion resistance is the essential requirement is the Klein-schmidt teletypewriter. The guide channel, through which a code-perforated tape moves at high speeds, is made of magnesium; the tape contains 50 per cent china clay and it is so abrasive that it rapidly wears through steel. Various finishes, including anodized aluminum and chrome plated aluminum, Dow No. 17 treated magnesium and HAE treated magnesium were tested. All the coatings tested, with the exception of the HAE failed completely within 24 to 300 hr. The HAE coated magnesium channel after 4000 hr of operation showed no sign of wear. At the end of 8000 hr of operation a small portion had finally worn through the hard brown coating to the subcoating.

The composition of the HAE coating is not quite known, however, X-ray diffraction studies revealed the presence of magnesium aluminate, a spinel. Other lines have not been identified; it is believed that some of the manganese in the coating is present in the form of a spinel also.

A most promising modification of the HAE process is the one produced in 6 min, the light tan coating. Operating conditions are the same as for the regular hard-type coating. Paint adhesion is excellent and the corrosion resistance of this coating with one coat of paint is far superior to the similarly painted dichromate treated surface.

The method of application of the new anodic coatings are sufficiently similar to warrant discussing them together and in greater detail, in order to bring out the advantages of the new anodic coatings over the old treatments which require very close bath control in order to obtain some degree of uniformity.

Bath Temperatures. The HAE operates at room temperature. During the coating formation some of the electrical energy is converted into heat and causes the bath temperature to rise. A cooling system, therefore, must be provided to keep the temperature of the bath below 85F (29C). The terminating voltage is 80 to 85 v.

The Dow No. 17 operates at 160F (71C) or higher. The terminating voltage is 110 v.

The Cr-22 operates at 203F (95C). The terminating voltage is 320 v.

To heat the baths of the Dow 17 and Cr-22 and keep the temperature within the required limits, a heating system must be provided.

At high bath temperatures loss of volatile ingredients, such as ammonium compounds will be quite rapid. However, this can be remedied by making more frequent additions of the chemical and proper adjustments determined by chemical analysis of the bath.

In the HAE process the lightening of the dark brown color which is characteristic of the coating, is used as a means of controlling the bath. The change in color indicates depletion of the manganate. Aluminum is used up at about the same rate as manganate. Hence, aluminum compound should be added each time additions of manganese compound are made. Depletion of the other ingredients of the bath, fluoride and phosphate proceed at a very slow rate. Additions of these compounds may be made every third manganate adjustment.

Although chromate baths do not show sufficient color variations with depletion of bath ingredients, the degree of depletion can be determined by chemical analyses. By increasing one of the constituents of the bath a color other than the normal green color may be obtained. The gradual depletion which undergoes during operation of the normal bath is not indicated by the color of the coating.

The dielectric strength of the anodic coatings is 550 to 600 v, with coating thickness of 1.5 mils. This indicates a non-conductive coating which should prevent galvanic coupling action in magnesium assemblies with dissimilar metals. However, certain precautions must be observed in order to effectively prevent galvanic corrosion. These precautions are based on the fact that the coating is brittle and regardless of its non-conductive property requires proper methods in assembling the parts.

It was stated earlier that when two dissimilar metals are coupled and exposed to corrosive medium, the metal anodic to the other will protect the other metal and itself will corrode. There are no stable metals anodic to magnesium. Steel the metal most frequently used in assemblies with magnesium is cathodic to it. If a break occurs in the coating during the assembly, the resulting corrosion will be more intensified at the damaged area than if the magnesium surface were bare, especially if the area of the exposed magnesium is small compared to the area of the steel in the assembly, because a very small area of magnesium must protect a large area of steel. It would be well to insulate the magnesium from the joined metals with plastic.

In the early stages of the development of the HAE coating, some preliminary galvanic corrosion tests were conducted. Copper, aluminum and steel discs, 0.040 to 0.050 in. thick and 2 in. diameter with a 3/16 in. hole in the center were used. HAE treated magnesium alloy AZ31 panels 4 by 6 in. and 0.050 in. thick were used in the assembly. The discs and panels were fastened with stainless steel bolts, and were subjected to the salt spray test. Subsequent examination of the assemblies revealed that distortion of the treated magnesium panels had occurred. The steel bolts were tightened excessively and damaged the coating and exposed magnesium. It also caused a small opening along the periphery of the disc thus permitting salt solution to enter. It was evident that the wrong technique was employed in assembling the parts. Not only the technique was wrong but the form of material used was not the proper one.

Tests on fatigue strength conducted for Frankford Arsenal by the National Bureau of Standards and also tests conducted recently at Frankford Arsenal show that the treatment causes a small loss in fatigue strength. However, this loss in fatigue strength is rapidly decreased as the metal thickness is increased. With thickness of 0.2 in. the fatigue strength loss is negligible.

REFERENCE

1. Bureau of Mines, Bull. 556 by H. B. Comstock

Harry A. Evangelides is a graduate of Brooklyn Polytechnic Institute, 1928, with a degree of B S in chemistry. After graduation he worked for General Colloid Mills under Dr. Charles L. Mantell and later for Barber Asphalt Company. The past 17 years he has been with the Ordnance Corps of the U. S. Army, the last 16 years of which have been in the Pitman-Dunn Laboratories, at Frankford Arsenal in various capacities, the last 9 years in the field of protective treatments for metals. He has published several papers in various technical journals in the United States and England. He is a member of the American Chemical Society, Research Society of America, American Electroplaters' Society and The American Ordnance Association.

INDICATE A 539. ➤

OFHC® ANODES

MADE ONLY BY AMERICAN METAL CLIMAX

And OFHC® Anodes are made only from OFHC Copper!

OFHC is high-conductivity, oxygen-excluded copper. It is not deoxidized copper.

When you use OFHC Anodes, some of the advantages you get are:

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smoother finishes •
product uniformity •

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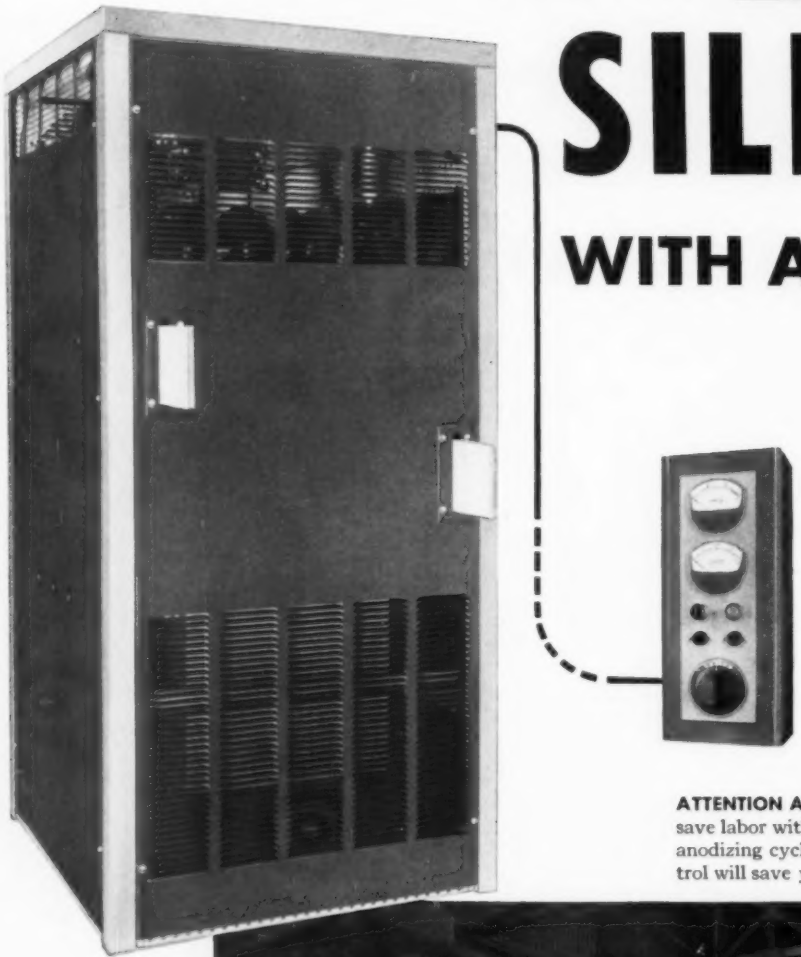
HERE'S NEWS FROM

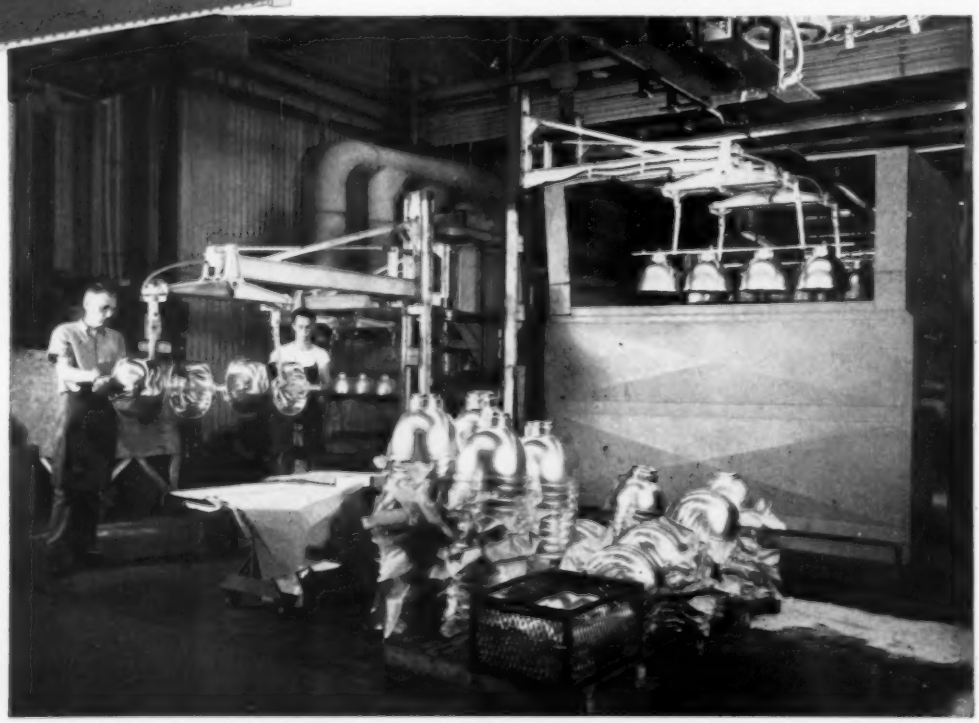
SILICON

WITH AUTOMATIC



IN A SMALL REMOTE CONTROL station you can now have any of these features of the new General Electric silicon plating rectifier: automatic current density, constant current, constant voltage, and automatic anodizing.

ATTENTION ALL ANODIZERS: avoid costly rework and save labor with automatic current density or automatic anodizing cycle control. If you color-anodize, this control will save you money with more consistent results.



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GENERAL ELECTRIC!

PLATING RECTIFIERS

CURRENT DENSITY CONTROL . . . AT NO ADDITIONAL COST!*

Check these benefits you can get with the *new* General Electric silicon plating rectifier!

- Silicon cells, conservatively applied to protect against damaging d-c overloads. The new G-E plating rectifier can withstand current surges far above continuous rating—without cell failure!
- With silicon equipment you can operate at higher ambient temperature (up to 113°F) than ever before—*without any derating!*

BUT, BY FAR THE BEST NEWS

is the Automatic Current Density Control! Now, for the first time, General Electric offers an automatic current density control *at a price any plater can afford.** Once you have tried this control you will not want to be without it! Now you can have just the proper voltage and current, whether you run one lightly loaded rack or eight fully loaded racks.

General Electric has been making large installations of Automatic Current Density Control since 1953. The success of this type control has been proved. While ***absolute*** constant current density control can be realized only with constant work area and constant current control, the new G-E control will serve as a close approximation in most cases.

How does Automatic Current Density Control work? Basically, a current signal is taken from the rectifier output and used to adjust the output voltage to compensate for various sizes of light loads. But for full details, send in the coupon below TODAY!

*Examples: 1 1/2 to 9 volts, 1500 amperes, only $1890; 4 to 24 volts, 2000 amperes, only $4600. Prices include automatic current density control and remote control box.

Progress Is Our Most Important Product

GENERAL ELECTRIC

TO: MR. J. E. MUNGENAST, Sec. B462-17
Rectifier Department, General Electric Company
Lynchburg, Virginia

Please send me more information—including prices—on the new General Electric silicon plating rectifier with Automatic Current Density Control.

Name_____

Company_____

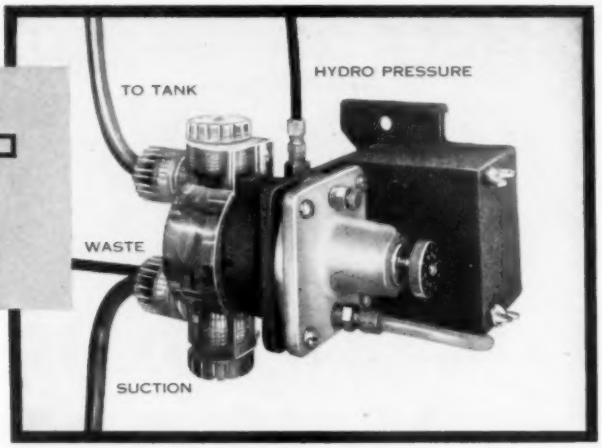
Address_____

City_____ **Zone**_____ **State**_____

☐ **I DO ANODIZING. Please send me information on anodizing control.**

New!

KEMO-TROL
PROPORTIONAL CHEMICAL FEEDER



Controls Additions of Plating Chemicals

ACCURATELY! . . .

Feeding of concentrated chemicals and addition agents is now made accurate and uniform with KEMO-TROL. Plating shops will find many economical uses for this proportional feeder.

- **Nickel brighteners added to plating baths**
- **Hypochlorites fed into waste water**
- **Zinc and cadmium brighteners for baths**
- **Acid additions for pH maintenance**

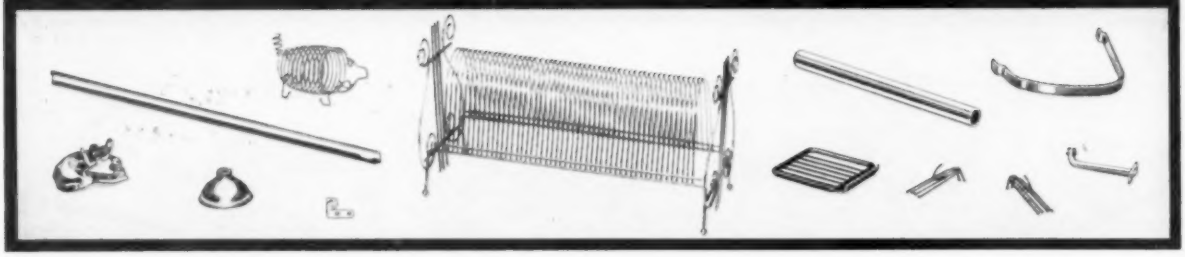
ECONOMICALLY! . . .

Low initial cost (only 1/3 as much as similar feeders) . . . low operating cost. Entire unit comes in one package. Two basic models available for varied corrosion conditions.

For complete details on KEMO-TROL and best model for your operation write to:

THE CHEMICAL CORPORATION, 57 WALTHAM AVENUE, SPRINGFIELD, MASS.

New Luster-on CHROMATES COLOR ZINC



ECONOMICAL! . . .

Now it's easy and inexpensive to secure beautifully bright, gleaming colors from a simple LUSTER-ON chromate dip process for your zinc plated small parts.

DECORATIVE! . . .

These are not just spotty identification colors. They are scintillating golds, yellows, blues, reds, greens, violets, brass and copper hues that add glamor and sales appeal.

Write or wire today for the full story on economical, decorative LUSTER-ON COLOR. Sample gladly processed free.

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WEST COAST:
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Los Angeles & San Francisco

CANADIAN LICENSEE:
Alloycraft Ltd., Montreal

ANNUAL REPORT

FOR THE FISCAL YEAR ENDED MARCH 31, 1958

PRESIDENT'S REPORT

AMERICAN ELECTROPLATERS' SOCIETY, INC.

by

Francis T. Eddy

THE year from June 1957 to the present has been very productive in the work of your Society. Many Boards, Committees, Groups and individuals have worked effectively for AES.

The Executive Board, in its regular meetings and through correspondence, has maintained constant contact with the problems and work of the Society and taken whatever action was agreed upon. The Executive Board has also been most cooperative in every instance and has worked very well together, giving the best of its combined knowledge. Each man has expressed himself on all subjects. With little, if any exception, decisions have been unanimous. It is my opinion that the Executive Board has worked in the best interest of the Society at all times.

BOARDS AND COMMITTEES

The many Presidential appointees have performed their tasks without exception. Special and regular committees, as well as individuals working in behalf of the Society, are to be commended for their selfless work.

The standing committees: Research, Editorial, Public Relations, Publications, Law, Credentials, and the new Educational, Membership and AES Scientific Achievement Award have performed well and progressed markedly during the past year.

All people who have served on these regular and special committees and assignments receive my warmest thanks for taking this responsibility and achieving such good results.

THE AES's BRANCHES

During the year I have visited many Branch and Regional functions. My visits have been far too few by my own desires, but have been limited by personal schedule and the many commitments.

The Branches have been very active and, probably because I have been in the front line, seem to me to be working better among themselves and with the National Office.

NATIONAL HEADQUARTERS

During the remainder of this year and every year it is my hope that the strength and number of the Branches will grow, for herein lies the whole future of AES. The life and breath of this Society is in the individual member of the several Branches.

The National Office in Newark has continued to grow in experience and maturity under the Executive Secretary, John P. Nichols. The entire staff deserves our thanks and appreciation.

PUBLISHING AND MEETINGS

The Society magazine, PLATING, and TECHNICAL PROCEEDINGS have been published by the Newark staff with ever increasing efficiency and effectiveness. PLATING is emerging as the nation's leading finishing magazine as evidenced by ABC audits

An Interim Meeting which was held in Indianapolis on January 11, 1958, was attended by Delegates representing 24 Branches who exchanged ideas and reported progress. The Annual Convention will be held in Cincinnati from May 19 through May 22, 1958. The chairmen and their several committees are working hard to make this year's Convention an outstanding success.

IN CONCLUSION

Many people working in many capacities have made possible whatever success AES enjoyed this year. Again, my sincere personal thanks go to each one. Through their efforts and others like them who follow, the American Electroplaters' Society will have a bigger and brighter tomorrow.

Openly, I want to thank the Directors of Technicraft Laboratories, Inc. for their cooperation and understanding during this period.

It has been a distinct pleasure and privilege for me to serve as your president this year. I am very much appreciative of the opportunity to be of this service.

Francis T. Eddy

FIRST VICE PRESIDENT'S REPORT

by

Herberth E. Head

In accordance with the Bylaws, Article 2, Section 3, prior to the Montreal Convention June 1957, the specific assignment of duties within the Executive Board gave this officer the responsibility of guiding the activities of the Educational Committee. The duties of this assignment are so varied that it is difficult to enumerate them.

It is evident that the members of the Supreme Society realized this fact for at the Annual Meeting in Montreal, a complete reorganization of this important committee was authorized. In the reorganization, the committee was so constituted as to give it the degree of continuity so necessary to make it effective. It also elevated the committee to national level comparable to the Editorial Board and the Research Committee.

THE NEW EDUCATIONAL COMMITTEE

The principal medium of educational activities has for many years been the monthly publication, PLATING.

Dr. Heiman and President Eddy, during their respective tenures as Educational Chairmen, exerted every effort to arouse interest in the Branches as to the need for a course of instruction in the field of electroplating. It is the intention of the newly organized Educational Committee to establish some form of correspondence course for members who belong to small Branches or who belong to the Society as Members-at-Large.

In any well-managed organization, the President outlines a program of objectives for the organization to achieve. President Eddy was no exception to this method of operation. In his inaugural address to the Board, he charged the First Vice President with the responsibility of organizing the new Educational Committee. His directive was successfully accomplished. You now have a very capable organization under the chairmanship of Dr. Dodd S. Carr.

Herberth E. Head

MOHAWK VALLEY BRANCH INSTALLED
Above National President Eddy delivering Charter to Branch President Francis A. Czech November 14, 1957 installing Mohawk Valley as AES's 57th Branch. The Blue Ridge Branch was installed, March 28, 1958, as the 58th Branch.

THE COMMITTEE'S OBJECTIVE

This committee has submitted a set of Bylaws and a scope of objectives that have been approved by the Executive Board and are now off and running. The scope of this committee is as follows:

1. The object of the AES Educational Committee shall be to promote the dissemination of knowledge of the science of electroplating, the finishing of metal and allied arts.
2. Providing a medium for communication and cooperation among those interested in any phase of training or education of persons advancing, practicing, learning, or otherwise primarily concerned with electroplating, metal finishing and allied arts.
3. Providing an organization to foster, promote and help education in the field of electroplating, metal finishing and allied arts through the establishment and maintenance of training courses and through the distribution of Branch Speakers Lists.
4. Collecting, collating and distributing educational aids such as: reference list on electroplating textbooks and industrial plating literature; articles on methods of conducting training courses and lists of films available on electroplating, metal finishing and allied arts.
5. Promoting high standards in the educational programs given in the fields of electroplating, metal finishing and allied arts through the establishment and maintenance of suitable awards for outstanding contributions in this area by individuals, AES Branches, or educational institutions.
6. Providing suitable recognition for students who complete training courses approved by the Educational Committee.

This is your Educational Committee. If you are in need of assistance, please ask for it.

IN CONCLUSION

The First Vice President has attended all meetings

of the Executive Board and many Branch and regional meetings as well. My thanks are expressed to the Chrysler Corporation for making time and funds available in carrying out the duties of this office.

My thanks are further expressed to the membership for affording me the opportunity of serving you.

SECOND VICE PRESIDENT'S REPORT

by

Ralph D. Wysong

DURING the past year, your Second Vice President has directed his efforts toward the Membership and the Organic Finishing Committees of our Society. The former as prescribed by our Bylaws and the latter by appointment of our President.

MEMBERSHIP PROMOTION

The editorial, "Blueprint of your Society's Future Growth," which appeared in the October 1957 issue of PLATING explained the set-up and workability of our new rotating nine-man Membership Committee which had its organization meeting on December 7, 1957 in Detroit. Manuel Ben (Detroit) was elected Chairman and Robert L. Garrett (Kansas City) was chosen as Secretary. Your Second Vice President acted as temporary Chairman of this meeting.

After writing a tentative set of Bylaws, later refined and sent to all members for approval, the committee made plans along two lines for promoting membership in the Society. Immediate and long-range promotion was considered. For immediate promotion, the Chairman was authorized to contact all Branch First Vice Presidents calling their attention to a reprint of the October PLATING editorial on membership and asking them to start such a campaign in their Branch. For long-range promotion, a new leaflet and application blank were considered. The next meeting was set for January 11, 1958 at the Interim Meeting in Indianapolis, Indiana.

At Indianapolis, the Bylaws were approved and later ratified by the Executive Board, and after a discussion of the various duties of this committee, different members were given specific assignments to develop as far as possible by the next meeting, to be held at the Convention in May. These assignments were: a monthly letter to every Branch Membership Chairman, a study and review of the Membership Section of the Branch Officer's Manual, a possible 25-year membership certificate, the promotion pamphlet and membership blank and the study of standard identification badges for Branch meetings.

The alacrity and zeal which this committee has shown in its two short meetings, speaks well for its future, and the future of our Society's Membership. The wisdom of those who proposed this committee and the Supreme Society's ratification thereof, will be greatly rewarded.

Ralph D. Wysong

CURRENT MEMBERSHIP STATURE

During the past year, two new Branches have been granted charters, namely the Mohawk Valley at Utica, New York, and the Blue Ridge at Roanoke, Va. This brings the total number of Branches up to 58. A proposed Rocky Mountain Branch is in the embryonic stage, and we hope it will soon be ready for temporary charter. The accompanying graph shows that during the past fiscal year, our membership has increased from 7541 to 7832, but we are sorry to say too many members were also suspended. This problem of suspended members will be a challenge to our new Membership Committee. As happens every year, by the Grace of God, some members were lost in death as is shown in the accompanying necrology.

The following Branches are winners of the Membership Promotional Awards: 1) *Branches with 126 or more members:* Boston, 2) *Branches with 70 to 125 members:* Cincinnati, 3) *Branches with 69 or less members:* Kansas City.

To the Officers and Membership Committees of these Branches, congratulations for a job well done. To all others—"Go Thou and Do Likewise!"

ORGANIC FINISHING

In reading the reports of Branch Meetings, it is obvious that many Branches have taken advantage of the increasing interest in Organic Finishing and scheduled meetings on this subject. Where dual sessions

EXECUTIVE BOARD IN SESSION

Left to right clockwise, Ralph E. Jones (Clyde A. Zukswert & Co.); Third Vice President Wesley; Second Vice President Wysong; National Executive Secretary Nichols; President Eddy; First Vice President Head and Past President Heiman.

AES INCOME vs. EXPENSES

	INCOME	EXPENSES
1951-1952	$143,833.00	$114,849.00
1952-1953	$157,189.00	$139,591.00
1953-1954	$168,041.00	$156,765.00
1954-1955	$184,295.00	$168,199.00
1955-1956	$203,158.83	$211,629.00
1956-1957	$211,635.97	$211,616.76
1957-1958	$204,805.25	$205,782.92

NET WORTH, GENERAL FUND

1951-1952—$113,242.00
1952-1953—$150,918.00
1953-1954—$166,370.00
1954-1955—$182,465.00
1955-1956—$188,578.00
1956-1957—$188,225.01
1957-1958—$188,567.34

MEMBERSHIP EXPANSION*

1951-1952—5914 Members
1952-1953—6377 Members
1953-1954—6739 Members
1954-1955—6860 Members
1955-1956—7101 Members
1956-1957—7541 Members (Corrected)
1957-1958—7832 Members

** Includes Active, Members-at-Large, and Sustaining Members.*

PLATING PAID CIRCULATION

1951—6702 Subscribers
1952—6909 Subscribers
1953—7432 Subscribers
1954—7821 Subscribers
1955—8087 Subscribers
1956—8299 Subscribers
1957—8688 Subscribers
1958—9046 Subscribers (April 1)

Membership Report as of March 31, 1958

BRANCH	MEMBERSHIP MARCH 31, 1957 (CORRECTED)	ELECTED	REINSTATED	TRANSFERRED IN	TRANSFERRED OUT	RESIGNED	SUSPENDED	DECEASED	NET GAIN	MEMBERSHIP MARCH 31, 1958	SUSTAINING MEMBERSHIPS
Adelaide	42	—	3	—	—	—	5	—	− 2	40	—
Allentown-Reading	40	3	—	—	—	—	3	—	—	40	4
Baltimore-Washington	101	9	—	—	2	—	—	—	+ 8	108	4
Blue Ridge (A)	16	6	—	2	—	—	—	—	+ 7	24	—
Boston	148	29	—	1	1	2	3	—	+24	172	5
Bridgeport	150	4	—	1	1	1	7	—	− 4	146	5
British Columbia	38	6	—	—	—	—	—	—	+ 6	44	—
Buffalo	114	12	3	—	—	4	9	—	+ 2	116	1
Capitol District	44	14	1	—	2	—	9	2	+ 3	46	1
Central Michigan	55	11	—	—	—	1	3	—	+ 7	62	—
Chicago	473	35	2	3	4	10	67	2	−42.5	430	70
Cincinnati	106	19	—	2	1	1	1	1	+16.5	123	2
Cleveland	282	19	8	5	5	9	20	5	− 7	275	24
Columbus	72	17	—	—	2	9	—	—	+ 7	78	—
Dallas-Fort Worth	49	1	—	1	—	4	1	—	− 3.5	46	1
Dayton	123	16	—	4	3	2	3	3	+ 8.5	132	4
Detroit	681	112	18	16	9	17	58	1	+57.5	742	58
Grand Rapids	180	16	—	2	2	—	9	1	+ 6	186	15
Hamilton	33	15	1	—	—	—	3	—	+13	46	3
Hartford	173	17	2	1	1	—	8	—	+11	184	4
Houston	33	3	2	1	—	2	1	—	+ 2.5	36	1
Indianapolis	118	24	2	1	8	2	15	1	+ 4.5	119	2
Kansas City	44	18	1	—	1	—	—	—	+18.5	62	—
Lancaster	64	11	—	—	—	2	3	1	+ 5	69	1
Los Angeles	316	22	—	3	1	2	23	—	− 2	315	15
Louisville	49	5	—	—	2	2	2	1	− 1	47	1
Melbourne	161	19	8	—	—	3	19	—	+ 5	166	—
Miami	26	11	—	—	—	—	8	—	+ 3	29	—
Milwaukee	224	23	—	1	1	9	21	—	− 7	217	13
Mississippi Valley	60	16	—	1	—	—	6	—	+10.5	71	1
Mohawk Valley (B)	35	13	—	—	—	—	—	—	+13	48	—
Montreal	107	25	2	2	3	3	13	—	+10.5	117	3
Newark	330	38	3	4	6	4	19	3	+14	343	11
New Haven	121	3	—	—	2	—	14	—	−12	108	4
New York	345	29	3	—	2	5	6	—	+20	364	16
Philadelphia	235	23	2	3	2	5	3	—	+17.5	253	12
Pittsburgh	139	14	5	1	1	5	15	1	− 2	137	4
Portland	22	5	—	—	—	—	3	—	+ 2	24	—
Providence-Attleboro	96	4	—	—	1	2	1	1	− 0.5	95	2
Rochester	90	14	—	—	—	6	5	2	+ 1	91	5
Rockford	80	7	—	—	—	—	6	—	+ 1	81	1
Saginaw Valley	121	16	1	1	9	3	—	1	+ 9	126	—
St. Joseph Valley	117	8	1	—	—	—	1	—	+ 8	125	5
St. Louis	99	20	4	—	2	1	8	1	+15	111	12
San Antonio	16	1	—	—	1	3	1	—	− 3.5	12	—
San Francisco	69	10	2	1	—	—	—	—	+12.5	82	—
Seattle-Puget Sound	36	1	—	—	1	—	3	—	− 2.5	33	—
Southeastern	82	17	—	—	2	3	6	—	+ 7	88	1
Southern Tier	39	9	10	—	1	—	12	—	+ 6.5	45	1
Springfield	60	10	2	1	—	5	—	—	+ 7.5	68	2
Sydney	100	12	—	—	—	9	7	—	− 4	96	—
Syracuse	105	8	1	—	19	1	11	—	−12.5	83	1
Toledo	46	—	2	1	—	—	—	—	+ 2.5	49	2
Toronto	179	19	—	3	2	4	13	—	+ 2.5	182	12
Twin City	86	6	—	—	—	2	—	—	+ 4	90	—
Waterbury	142	7	1	3	3	4	1	2	+ 1	143	19
Western Ontario	37	3	—	—	—	3	—	—	—	37	3
Wichita	37	3	—	—	—	—	—	—	+ 3	40	1
Members-at-Large	216	23	3	1	2	2	1	—	+22.5	238	—
TOTALS (C)	7202	861	93	66	105	152	456	29	+297.5	7480	352 (D)

(A) Permanent charter effective February 1, 1958.

(B) Permanent charter effective September 21, 1957.

(C) Net gain is computed by rating transfers at .5.

(D) Adding 352 Sustaining Memberships (USA and Canada) to 7480 Active Members and Members-at-Large fixes AES's total membership, all ramifications, at 7832 as at April 1, 1958 compared with 7541 (corrected) at April 1, 1957. Last year's 7541 (corrected) resulted from 7202 Active and Members-at-Large plus 339 Sustaining Members.

have been tried, they have proved successful and have helped increase membership. The March issue of PLATING used Organic Finishing as its theme and the interesting subjects discussed should more than prove that Organic Finishing has become a part of the plater's daily life and is here to stay.

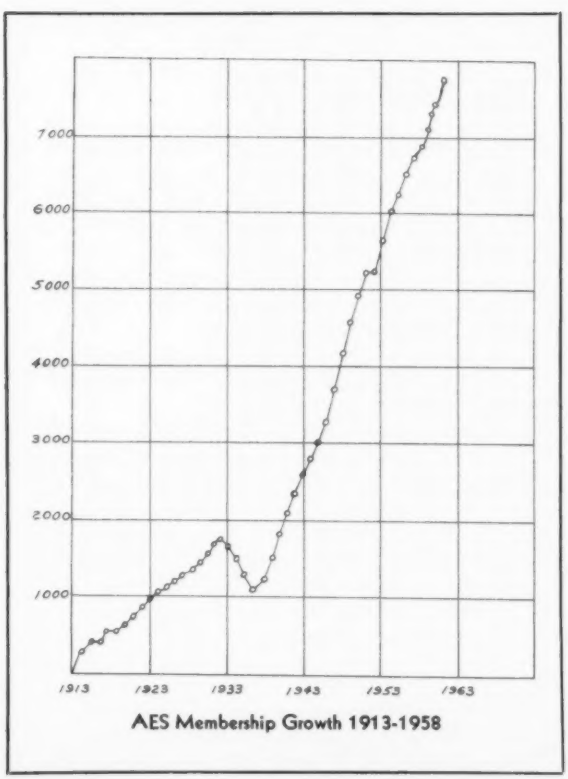
The abundance of correspondence received during the past year on various Branch stationery reveals that too many Branches overlook this important field or do not think it important enough to "push" on their stationery. Many misquote the "object" of our Society and print under the heading, American Electroplaters' Society, "An Educational Society for the Advancement of the Science of Electroplating," and leave off that important part "The Finishing of Metals and Allied Arts."

The Educational Committee organized during the past year will add to the Speakers List names of men qualified and willing to appear before the Branches and speak on various phases of Organic Finishing. One member is also surveying the possibilities of a training course on the subject.

With the help of the Educational Committee, the many aspects of Organic Finishing should soon become an integral part of our Society's activities and become better known to every member.

IN CONCLUSION

Attendance at the Executive Board meetings and many Branch Meetings during this past year has proved to your Second Vice President that it is both a privilege and a pleasure to serve you in this capacity. The educational opportunities and the wonderful people one meets through Society activities is more than sufficient recompense for the time and effort expended.



AES Membership Growth 1913-1958

Dr. W. Andrew Wesley

THIRD VICE PRESIDENT'S REPORT

by

Dr. W. Andrew Wesley

ACCORDING to the Bylaws of the AES, the duties of the freshman member of the Executive Board are to be a member of the Exhibit Awards Committee and to perform such other chores as may be assigned to him by the President or the Executive Board. It is understood, of course, that he must attend the scheduled meetings of the Executive Board.

AMENDMENTS OF AES LAW

The President assigned me the duty of acting as chairman of a special committee called the Constitution and Bylaws Revision Committee, the other members of which are Paul Croly, Milton Nadel and Richard A. Balbierz. I wish to report for the committee that during the year a number of amendments to the Constitution and to the Bylaws were prepared and recommended to the Executive Board. They have since been approved by the Supreme Society by letter ballot.

The first was an amendment to the Constitution (Part III, Section 1) changing the voting requirements for amendment of the Constitution from "a two-thirds vote of all Delegates, either at an Annual Meeting or by letter ballot" to read "a two-thirds vote, either at an Annual Meeting by roll call or by letter ballot." The second was a similar amendment to the Bylaws (Part III). These changes bring our laws into agreement with usual parliamentary practice of legislative bodies such as our Supreme Society.

Other amendments to the Bylaws which were enacted by letter ballot were necessary to bring dates mentioned in several sections into agreement with the new AES fiscal year beginning henceforth on July 1 instead of April 1. There were seven such changes made which will not be listed here since they were reported in full

in PLATING and are now incorporated in our Bylaws.

The Revision Committee has under consideration several new amendments to the Bylaws, some of which it may recommend to the Executive Board prior to the Cincinnati Convention.

IN CONCLUSION

I was fortunate in being able to attend meetings of eleven branches during the year. This activity has given me renewed pride in our organization and faith in its vigor in promoting the aims for which the AES was formed. I did become aware of a need for closer contact between the smaller Branches, the Executive Board and the various standing committees of our Society. I believe that some of these Branches are ready and willing to take a more active part in the affairs of our National Society. I shall do my best to formulate means for facilitating this and recommend them to the Executive Board. The increasing number of Regional Meetings is definitely an important trend in the right direction. I am sure there are also other ways to move faster toward our common goals.

PAST PRESIDENT'S REPORT

by

Dr. Samuel Heiman

THE position and role of the Past President of the AES are unique. He is a member of the Executive Board, yet is the only non-elected member of that body. He is the oldest in point of service. He will not stand for election at some future date; his administration is already past. Having no special duties assigned to him by the Constitution, he is a minister-without-portfolio. As a member of the Order of Past Presidents he is an active bridge between the past and present.

In this unique position, a Past President may and indeed does, act in the following ways: As an elder statesman dispensing wisdom and counsel as well as plain old Society lore; as a gadfly; as a suggester of copious recommendations and ideas since he is in a position not to be saddled with the execution of same. In which role your present Past President has predominantly acted will be left to his associates to decide.

Dr. Samuel Heiman

FIVE YEAR TOUR OF DUTY

The five year tour of duty and service as a national officer which began at the 1953 Philadelphia Convention is now drawing to a close. These have been busy years of participation in the direction of the affairs and policies of the AES and of working on many committees and projects while learning the multitudinous details of the Society's operation.

In looking back, one is left with kaleidoscopic memories of attending many regular meetings of the Board in many cities, none of which were missed, traveling the length and breadth of the country to speak before many Branches, burning the midnight oil and meeting and working with a large number of Branch officers and members. The considerable time and effort involved was further increased by extra work in connection with such projects as the Branch Officers Manual and the Convention Manual. All this work, which was described in detail in previous reports however, was a source of considerable satisfaction as ideas and plans developed through cooperative effort into useful activities.

In Memoriam

The Society mourns the loss of the following who passed away during the year. Their devotion to the Society and their contributions to its progress will long honor their memory.

PAST AES PRESIDENTS

Clarence L. Van Derau (*Dayton*).
Tenure: 1932–1933
E. Steen Thompson (*Cleveland*).
Tenure: 1936–1937

MEMBERS

Capitol District: J. W. Eastham, John J. O'Connor
Chicago: O. Bedard A. Pochowicz
Cincinnati: C. L. Lancaster
Cleveland: A. D. Sopher, F. Walker, R. O. Hull, J. C. Singler
Dayton: M. A. Kenny, J. G. Walker
Detroit: G. W. Kennedy
Grand Rapids: L. Grave
Indianapolis: L. S. Fisher
Lancaster: O. E. Borden
Louisville: J. G. Sterling
Newark: S. E. Barr, R. F. Clark, F. Gumm
Pittsburgh: J. Weigand
Providence-Attleboro: W. F. Cahill, Sr.
Rochester: H. J. Blasl, T. J. Campbell
Saginaw Valley: R. Parker
St. Louis: L. V. Schowalter, P. E. Miller
Waterbury: A. D. Chabot, A. Perrin

GROWTH DURING THAT SPAN

During these five years the membership of the Society has increased from 6065 to 7832 and the number of Branches has increased from 48 to 58. This quantitative growth has been matched by steady improvements in the quality of the Society's activities including the publications, the Conventions, the manifold operations at Headquarters as well as continued development of the Research program and Branch programs.

I shall resist the urge to mention here incompleted projects or ideas for future growth. These matters are known, and with the present Board, are in capable hands.

IN CONCLUSION

It is to be hoped that the Supreme Society will continue to elect the best possible officers to guide the affairs of the Society. It is to be hoped that Delegates themselves will continue to ever improve their knowledge of Society matters and current issues in order to legislate wisely and effectively and that they will keep their Branches fully informed.

In this way the Society will continue to grow and flourish—fulfilling as it does, a vital need and place in the advancement of the Science and the Industry and having, as it does, a large number of capable members devoted to the best interests of the Society and willing and able to serve it.

EXECUTIVE SECRETARY'S REPORT

by

John P. Nichols

In the 1957–1958 fiscal year ended March 31, 1958—on the very threshold of its Fiftieth Anniversary to be observed in 1959—the American Electroplaters' Society, Inc. (AES) experienced continued progress from practically every standpoint. Its global membership, for instance, swelled from 7541 members, in all ramifications, on April 1, 1957 to 7832 on April 1, 1958. And the number of its Branches in the United States, Canada and Australia mounted during that same twelve-month span from 56 to 58—meaning a four-Branch increase in the last eighteen months.

Restaffed since the start of the writer's tenure as National Executive Secretary on June 1, 1956—still numbering thirteen, including the writer—National Headquarters further demonstrated itself by the quantity and quality of its output and performance during 1957–1958. Over and beyond its heavy normal workload, in fact, it additionally assimilated and harnessed the many structural improvements that were undertaken by the Supreme Society at that summit governing council's Annual Meeting in Montreal, June 20, 1957.

Compared, finally, with an $8,470.47 consolidated "expense over income" deficit for the fiscal year ended March 31, 1956, and a $19.21 "income over expense" surplus for the fiscal year completed March 31, 1957, the AES concluded its fiscal year on March 31, 1958, a year whose last quarter was steeped in business recession for practically everyone, with a consolidated "expense over income" deficit aggregating about $977—this according to reliable data prepared for this report by Headquarters' Accounting Division pending completion and certification of the fiscal year's final audit statement by Clyde A. Zukswert & Co.

These data disclose these comparative Society/PLATING breakdowns—not, of course, including the AES Research Program which, being an entity unto itself, will separately be reported in the final Zukswert certified audit statement as usual: (*See footnote next page*)

INCOME

	1955–1956	*1956–1957*	*1957–1958*
Society	$ 34,776.36	$ 35,037.41	$ 34,886.56
PLATING	168,382.47	176,598.56	169,918.69
	$203,158.83	$211,635.97	$204,805.25

EXPENSE

	1955–1956	*1956–1957*	*1957–1958*
Society	$ 48,613.15	$ 58,904.56	$ 55,205.37
PLATING	163,016.15	152,712.20	150,577.55
	$211,629.30	$211,616.76	$205,782.92

Against a national economic background of receding business and mounting costs affecting everyone manifested, income-wise, for Society/PLATING, as with so many others, by a disappointing last fiscal quarter, it is otherwise heartening that, expense-wise, the foregoing record was made despite more Branches, Committees and Members served in 1957–1958 than in any previous year, and a larger PLATING MAGAZINE circulation accommodated. The latter was accomplished despite absorption of unbudgeted expense incident to structural improvements that were undertaken by the Supreme Society last June without any provision for extra income to bear their cost. It was made, moreover, without dues increase of any sort.

Now these specifics, in highlight, so as to see the subject whole and understand it fully.

John P. Nichols

STRUCTURAL CHANGES EFFECTED BY THE SUPREME SOCIETY

The AES's highest governing council, known as "Supreme Society," is composed of three duly elected Delegates from each of the 58 chartered AES Branches. Accredited by the Credentials Committee, these Delegates, as a body, are the year-round governors and lawmakers of the Society.

Significant legislation enacted by the Supreme Society at its Montreal Annual Meeting last June 20, included the following:

1. It fixed the tenure of Delegates to extend from the first Branch Meeting immediately following the Annual Meeting of the Supreme Society, to the first Branch Meeting following the Supreme Society meeting twelve months hence.
2. It required each Branch to identify its three elected Delegates/Alternates to the National Executive Secretary by the first Monday in November through an official instrument, signed by both the Branch President and Branch Secretary, certifying the election and good standing of these designated Delegates/Alternates.
3. Upon accreditation of each of these Delegates by the Credentials Committee, it required the Executive Secretary to provide each with a copy of the booklet, "Delegates Manual," that it instructed him to publish delineating Delegates' duties.
4. By Constitutional and Bylaw amendment, it altered the fiscal year of the Society from the twelve-month period from April 1 through March 31, to the twelve-month period from July 1–June 30.
5. It withdrew responsibility for the AES's educational and membership promotion generalship from the respective portfolios of the First Vice President and the Second Vice President, and instead vested them in respective nine-man standing committees respectively including these officers. In addition to these newly created committees, it re-created the Publications Committee, the Public Relations Committee and the Exhibit Awards Committee as nine-man standing committees empowered with the functions specified by their names.
6. It made the Interim Meeting a mandatory annual occurrence, and reserved to itself, the authority to choose its site and to set its date. As a start, however, it empowered the Executive Board to determine the locale and date of the 1958 Interim Meeting.
7. It increased the number of the AES's Paper Awards from six to eight, and reconstituted them by continuing the Heussner Gold Medal as the highest award for the best convention or PLATING paper but adding a Silver Medal and Bronze Medal for the second and third best such papers. The cash prize was increased for the Heussner Award to $250; was priced at $150 for the Silver Award; was made $50 for the Bronze Award. The Hogaboom Award became the prize for the best paper on nickel plating, and its monetary value was upped to $75. The Robert S. Leather, the Chromium Plating and the Precious Metal Awards were continued as before. The eighth Award became the John J. Hanney Memorial Award, a prize for the best paper on copper plating co-sponsored by the Grand Rapids Branch and the Metal & Thermit Corporation with a cash value of $75.
8. It established the "AES Scientific Achievement Award" as the Society's highest medium of recognition for outstanding industry service by an AES member over a ten-year span—and created a six-man committee to select him, annually, from among Branch nominations. With the first such "William Blum Lecturer" to be named by the Committee at the Cincinnati Convention in 1958, and delivery of the actual lecture to take place at the Detroit Convention in 1959, the awardee will receive a $500 honorarium from the Society, beside a scroll and other suitable recognition.

*The complete certified audit report for the fiscal year ended March 31, 1958, prepared by the independent certified public accounting firm of Clyde A. Zukswert & Co., will appear in the kits of all Delegates/Alternates at the Meeting. It will be published in full in the June issue of PLATING magazine.

Rodney Leeds
Editor

Mrs. Ann Marsh
Office Manager

Thomas W. Lowe
Production Manager

SUPREME SOCIETY'S STRUCTURAL CHANGES HARNESSED

The foregoing changes were effectively harnessed within necessary time limitations without unduly affecting, 1) the normal course or tempo of Branches, 2) normal member relations or 3) the workload of Headquarters already at saturation point. It might be added that the doing required maximum in planning, coordination, cooperation, effort—timely and close consultation with counsel and accountants—an abundance of necessary bulletins, correspondence, balloting and other communications. It added unbudgeted expense. End result, however, was achieved.

Delegations were certified by Branches to Headquarters—were then accredited by the AES's diligent Credentials Committee—received the newly created "Delegates Manual"—legislated on these necessary matters channeled to them by the Executive Board for consideration and action by letter ballot:

1. Amended, necessarily, sections of the AES Bylaws collateral to those sections applicable to the Society's fiscal year that were altered by the Supreme Society at its Montreal Meeting in June 1957.
2. Authorized a 15-month per capita tax billing period (for this one time) as an expedient for effecting the transition to the Society's new July 1–June 30 fiscal year, this 15-month period to span from April 1, 1958 through June 30, 1959.
3. Approved an "interim" Society/PLATING budget covering the transition period from April 1, 1958 through June 30, 1958 as a bridge to the twelve-month budget that it will consider at its Annual Meeting on May 22, 1958 covering the period from July 1, 1958 through June 30, 1959.

Among other enacted legislation, moreover, the Delegates, by signed letter ballot vote of 125 to 20, amended the AES's Constitution, and by signed ballot vote of 124 to 20 altered its Bylaws, thereby enabling modification of these instruments hereafter by 2/3rds of votes *cast* by Delegates as per Robert's "Rules of Order," instead of by 2/3rds votes of *ALL* Delegates as heretofore provided.

With a number of Branches vying for assignment as Host Branch of the Fifth Interim Meeting, the Executive Board selected the able Indianapolis Branch as such, and a successful winter assembly of the Supreme Society was held at that municipality's Marott Hotel, January 11, 1958. With 24 Branches officially represented, that meeting justified itself as a sounding board on Annual Meeting business to be considered in Cincinnati in May. And so as to enable Branch Delegates to participate even more effectively in those Cincinnati deliberations, the published proceedings of that Interim Meeting were issued to all Delegates, as well as to Alternate Delegates and Branch Presidents and Secretaries.

The Society's eight paper awards were finalized as altered by the Supreme Society. And the "AES Scientific Achievement Award Committee," having received nominations of nine distinguished AES members by seven AES Branches, will announce the first "William Blum Lecturer" at the Opening Session of the 45th Annual Convention in Cincinnati on Monday, May 19.

BRANCH COORDINATION AND SERVICING

The foregoing adjustment program was, of course, special and additional to National Headquarters' diverse normal activities so vital to successful AES operation. Coordination and servicing of AES's 58 American, Canadian and Australian Branches so as, in turn, to aid them in conducting effective educational and other programs beneficial to Branch members was a consistently stressed and further developed Headquarters' function in 1957–1958.

Tools to this end included "*Branch Officers Manual,*" a handbook now in helpful use in most Branches; "*Technical Proceedings*" (1957 Edition), a book publishing 44th Annual Convention papers and discussion that aided in enriching the technical knowledge of the AES's membership; "*Speakers List*" (1958 Edition) that should assist Branch Librarians in scheduling high quality Branch educational sessions; "*Business Proceedings*" (1957 Edition) that presented the Minutes of the Supreme Society's fruitful meetings in Montreal last June; many other functional and special media important to resultful Branch operation.

Miss Kathryn H. Langan
Office Accountant

Harry A. Johnston
Advertising Manager

Mrs. Loretta Ehrhardt
Advertising

All National Officers shared, moreover, in the pleasant duty of visiting Branches. Though the year's demands of National Headquarters; PLATING MAGAZINE; the Research Program; Executive Board and other AES business and publishing affairs necessarily limited his Branch itinerary, your Executive Secretary, nonetheless, happily managed to visit at least a quarter of the Society's Branches during the fiscal year. In addition, he served on President Eddy's teams of National Officers who installed the Society's new Mohawk Valley and Blue Ridge Branches. At some of these Branch visits, he showed "The Slide Story of the AES."

INTERNAL AND EXTERNAL PUBLIC RELATIONS

Assisting the Executive Board in spearheading a sound national program in behalf of the Society, its Branches and its members are a dozen Standing Committees, including the Editorial Board, the Research Committee and others. These are supplemented by some eight functional Special Committees such as the Law Committee, the Credentials Committee and others. In addition, the AES is represented on fifteen intersociety groups by eighteen liaison representatives appointed by the President. The leadership and personnel of these Boards and Committees are listed elsewhere in this Annual Report with Society and Board appreciation for well-done work in behalf of the AES in 1957–1958.

In the performance of their functions, these Standing and Special Committees were given full aid and cooperation by National Headquarters. In addition, the National Office continued to develop and cement a sound, mutually helpful relationship not only with companies and individuals dealing with it but also with a number of Societies and Associations having kindred interests. Compatibility and mutuality enhance cooperation—effective cooperation enhances prestige. The AES Branch and the AES member were and are the ultimate beneficiaries of enhanced AES reputation and of resultant greater good will, priceless end-result of practical public relations.

PLATING MAGAZINE'S 1957-1958 PROGRESS

Official journal of the farflung membership of this Society, in all of its ramifications—originated and owned by its members—tailored to serve them—PLATING MAGAZINE is produced monthly by publishing professionals of long standing. Technically and scientifically, these publishing practitioners are buttressed by a diligent Editorial Board composed of experts in their respective fields. This targetted teamwork has enabled PLATING to make sizable progress in 1957–1958.

Another important result of planning and follow-through is the growing reservoir of technical and scientific papers that either have already been reviewed and scheduled for specific future PLATING issues or are in the process of preparation as this is written. Regardless of this improved estate, however, there is continued need, of course, for unrelaxed effort to inspire the creation and availability, for PLATING publishing consideration, of worthy original papers furthering technical and scientific knowledge.

During the fiscal year, moreover, PLATING achieved another milepost in its 45-year life to date. It attained membership in the Audit Bureau of Circulations (ABC), thereby demonstrating that it met and meets the exacting standards in building and servicing circulation audience that ABC rigidly requires. And as of the six-month period ended December 31, 1957, latest for which Publisher's Statements of the ABC are available as this goes to press (April 1958), PLATING MAGAZINE, continued to enjoy the largest ABC paid circulation in this field, and by far the smallest unpaid circulation.

HEADQUARTERS AND AES RESEARCH

Under the direction of a seasoned Research Committee, implemented by an effective network of supervisory echelons, the AES's Research Program in universities and foundations here and in Canada had a creditable 1957–1958 fiscal year of performance as detailed elsewhere in this report by its Chairman. Apart from your Executive Secretary's service as Secretary-Treasurer of that program, National Headquarters

Charles B. Niebling
Member of the prominent law firm of Lum, Fairlie and Foster of Newark, N. J., General Counsel of the AES.

Clyde A. Zukswert
Head of Clyde A. Zukswert & Co., Newark's noted certified public accounting company, and AES's long-time Auditor.

Bob Wettstein
Head of Bob Wettstein & Associates, PLATING MAGAZINE's award-winning Western Advertising Representative.

played a large role in the dissemination of research information during the year, particularly in the editing and publishing by Rodney Leeds, AES's able editor, and Thomas W. Lowe, its production expert, of Serial Reports on the specific results of AES research. Headquarters also responsibly serviced Sustaining Members.

Prominent in the fiscal year's work, furthermore, was the publication of a Research Program section in the April 1958 issue of PLATING—a diminutive but well-received sequel of the sizable special section featured in the April 1957 issue. Also created during the fiscal year was the membership promotion booklet focused upon prospective Sustaining Members titled, "Is Advancement in Electroplating and Metal Finishing Important to YOUR Company's Future?"

HEADQUARTERS AND THE 1958 CINCINNATI CONVENTION

Among the many tools for self-betterment provided to its members by the AES and its 58 Branches is a well-planned, popularly priced, versatile Annual Convention. This year's 45th Annual Convention is another example of effective cooperation among an enthused, experienced Host Branch—an industrious Convention Committee well led—an inspired Editorial Board that provided alert supervision and direction to the fashioning of educational sessions—and, finally, National Headquarters that extended expert promotion, publicity and other specialized assistance.

IN CONCLUSION

In recapitulating, in purposely sketchiest highlight, this arduous fiscal year of maximum performance while still building, it can properly be reported that the American Electroplaters' Society experienced continued progress from practically every standpoint.

Its membership stature burgeoned forward. Its Branches increased by two. It successfully assimilated structural changes legislated by its highest governing council in Montreal last June.

Its farflung membership and its 58 Branches were creditably served by an effective though still relatively new Headquarters' organization that is maturing in AES service. Its publishing activities, particularly PLATING MAGAZINE, made substantial forward strides. It continued to enrich technical and scientific knowledge in electroplating, metal finishing and allied arts not only by its research program and through well-received AES literature but also via papers delivered before its National Convention.

And compared with an $8470 consolidated Society/PLATING "expense over income" deficit for the year ended March 31, 1956 and a $19.21 "income over expense" surplus for the fiscal year concluded March 31, 1957, it completed its fiscal year on March 31, 1958 with a consolidated "expense over income" deficit of about $977, result of an income-wise disappointing last fiscal quarter in a period of nationwide business recession.

Any and all AES progress is, of course, the collaborative handiwork of many AES elements, including the Supreme Society; the Executive Board; Branches and Branch leadership; Standing and Special Committees; PLATING and Convention paper authors; members, individually and collectively, here and abroad—plus, of course, the dedicated staff at Headquarters that demonstrated itself notably by the quality and quantity of its output.

Mrs. Florence K. Marquardt
AES's convention reporter. Her record: 21 consecutive AES conventions plus 4 of 5 Interim Meetings.

To all the aforementioned, AES congratulations are in order for a generally good year. And to staff, the same congratulations—but with a very special and proud "thank you."

RESEARCH CHAIRMAN'S REPORT

by

R. A. Ehrhardt

INTRODUCTION

THE Research Program continues to progress at the maximum rate consistent with current income. All of the personnel connected with this program continue to labor diligently to further its objectives which are also those of the Society—the advancement of the science of electroplating, the finishing of metals and allied arts.

The current committee has been extremely active, particularly in the examination of the structure and operation of the program. They have initiated changes designed to improve the overall efficiency and thereby hope to ease the burden of future committees.

Although no new projects have been started in the current year, the committee has accumulated a backlog of proposed projects. These reflect, as does the present program, a reasonable balance between applied and basic research. As plating continues to progress from an art to a science, it is expected that the ratio of basic to applied research will increase.

GENERAL

Seven projects have been active for the full year. There have been some changes in personnel but these did not necessitate any interruptions. The pertinent information on the current projects is given in Table 1. The practice of sending the Quarterly Reports of the Vice Chairman, Research to all Sustaining Members

has been continued, since it is felt that they are vitally interested in the progress of the program.

RESEARCH CONFERENCE

A conference of the members of all active Research Projects was held in Washington, D. C. in December 1957 under the able sponsorship of the Project 13 Committee. The current status of all projects was reviewed and a beneficial exchange of ideas resulted. A brief news report was prepared and published in the February 1958 issue of PLATING. The response to this conference was most gratifying and it is felt that future conferences will be desirable.

PUBLICATIONS

An accumulation of Research Reports that had not been published in Serial Report form has been eliminated by the publication of six Serial Reports, Nos. 33 through 38. Two papers were published in PLATING, and one in "Technical Proceedings."

PRESENT STATUS OF RESEARCH PROJECTS

PROJECT 12—Cleaning and Preparation of Metals for Electroplating.

This project has continued its work on the effect of oxide thickness on the adhesion of nickel deposits to oxidized copper surfaces. It has also renewed its studies on the spreading rates of oily soils. The latest results confirm the earlier findings. New apparatus has been constructed and the methods of testing have been standardized.

PROJECT 13—The Nature, Cause and Effect of Porosity in Electrodeposits.

Results of numerous tests indicate that Light-photographic methods are the most suitable for the detection of pores in foils. Preliminary studies using gold plating in place of nickel plating indicate that better correlation between the number of pores detected before and after corrosion exposure can be obtained. These studies are being continued. The effects of gases both in the metal and in the solution on the porosity of the deposits are being studied.

PROJECT 14—The Influence of the Physical Metallurgy and Mechanical Processing of the Basis Metal on Electroplating.

The Acetic Acid Salt Spray and the Corrodekote tests developed by Project 15 have been successfully employed in the evaluation of the quality of nickel plated specimens. Some success has been experienced in correlating obvious surface defects with subsequent corrosion failures. These studies are continuing and studies of the effect of stress in the basis metal on corrosion failure are being considered.

PROJECT 15—Accelerated Corrosion Tests for the Performance of Plated Coatings.

Considerable progress has been made by this Project, and they have developed the two most satisfactory tests to a point where they are approaching standardization. They are, however, proceeding with the utmost caution and much confirmatory work remains to be done. Since a satisfactory source of truly replicate panels has not been found these studies require the testing of numerous panels and subjecting the results to extensive statistical analysis.

Robert A. Ehrhardt

PROJECT 16—Mechanism of Electroplating.

Using specially purified solutions and extremely careful experimentation, this project is making satisfactory progress in exploring the possible mechanisms of electroplating. A report is being prepared, but due to the highly technical nature of this work, some difficulty is being experienced in writing this paper so that it will appeal to everyone.

PROJECT 17—Microthrowing Power.

This project is actively seeking a suitable method for the quantitative determination of microthrowing power. Since throwing power is a deviation from the theoretical expectation of distribution of deposited metal, it is necessary to find a suitable system for which the primary distribution can be calculated. Once this has been accomplished, the effects of different variables and solutions can be studied.

PROJECT 18—Mechanical Finishing of Metal Surfaces.

Excellent progress has been made in securing the required equipment, materials and personnel. The experimental procedure has been outlined and active prosecution of this project is to be expected.

CURRENT AND FUTURE PLANS

Since all projects have been active for the full term, it is expected that all of the monies budgeted for research will be expended. It is conceivable that next year's expenditures may exceed income. Consequently, no new projects can be contemplated unless income can be increased, which does not seem too probable. The Research Committee is, however, aware that new projects will be needed to replace any that might reach a satisfactory termination. The subcommittee on new projects is still very active and will appreciate receiving suggestions.

A satisfactory financial reserve exists so that there is no danger of having to cancel any of the current work for lack of funds.

CONCLUSION

The current Research Committee has been exceedingly active and has great interest in its work. The backlog of unpublished Serial Reports has been elimi-

Leland M. Morse
Member

Walter R. Meyer
Member

Russel E. Harr
Vice Chairman
Research

William Blum
Honorary Member

George E. Best
Vice Chairman
Finance

John P. Nichols
Secretary-Treasurer

Kergan Wells
Member

nated. Much time and labor has been expended in reorganizing the structure of the program in order to increase its effectiveness and to eliminate possible confusion. A new promotional booklet "Is Advancement in Electroplating and Metal Finishing Important to Your Company's Future?" has been published and distributed.

In closing this report, the Chairman wishes to thank all who made this year's accomplishments possible. These thanks include all of the Project Committee Members, Directors and Fellows, the District Supervisors, and the District Finance Supervisors. The Project 13 Committee is to be commended for its splendid work in organizing the Washington conference. Special thanks go to the members of the Research Committee who worked conscientiously to further this program, and particularly to the Sustaining Members, without whose loyal support this undertaking would not have been possible.

SUMMARY OF AMERICAN ELECTROPLATERS' SOCIETY RESEARCH PROJECTS 1957-1958

Project	Location	Project Director	Committee Chairman	Fellow	Subject	Status
12	Columbia University	Dr. H. B. Linford	E. T. Candee	D. Feder A. Venkateswarlu	Cleaning—Oxide Effects	Active
13	Bureau of Standards	F. Ogburn	C. H. Sample	Dr. D. Ernst	Nature, Cause and Effect of Porosity in Electrodeposits	Active
14	Ontario Research Foundation	Dr. M. H. Jones	W. M. Tucker	J. Zajdowski	Effect of Basis Metal Conditions on Plating	Active
15	Detroit Area	None	W. L. Pinner	None needed	Accelerated Corrosion Tests	Active
16	University of Pennsylvania	Dr. J. O'M. Bockris	E. Bowerman	Dr. W. Mehl	Mechanism of Electrodeposition	Active
17	Virginia Institute for Scientific Research	Dr. H. Leidheiser Jr.	Dr. W. M. Meyer	Dr. K. Killer	Microthrowing Power	Active
18	Chicago Area	W. C. Geissman	C. J. Kennedy	None needed	Mechanical Finishing of Metal Surfaces	Active

F. A. Lowenheim
District Supervisor

Cleveland F. Nixon
District Supervisor

James D. Thomas
Member

Leslie L. Diveley
Member

Glade B. Bowman
Member

Clyde Kelly
District Supervisor

Clarence H. Sample
District Supervisor

BRANCH DELEGATES COMPOSING THE SUPREME SOCIETY

The AES's highest governing Council, known as "Supreme Society" is composed of these duly elected Delegates from each of the 58 chartered AES Branches. Accredited by the Credentials Committee, these Delegates, as a body, are the year-round governors and lawmakers of this Society in 1957-1958.

ADELAIDE

1. T. F. Pierce
2. M. K. Birrell
3. R. J. Down

Alternates

1. J. W. Blanch
2. D. G. McNamara
3. W. Minahan

ALLENTOWN-READING

4. Raymond Housel
5. Edgar Henry Lobst
6. George Oswald

Alternates

4. Harold Doty
5. Joseph Ross
6. Leroy Kreider

BALTIMORE-WASHINGTON

7. Vernon A. Lamb
8. George E. Best
9. Fielding Ogburn

Alternates

7. Jules Horelick
8. Arthur G. Pierdon
9. E. E. Oberland

BLUE RIDGE

172. Nelson F. Murphy
173. C. R. Hudgins
174. John E. Mungenest

Alternates

172. Howard R. Welfare
173. P. D. Callahan
174. T. R. Boggess

BOSTON

10. George P. Swift
11. Louis V. Gagnon
12. Manson Glover

Alternates

10. Charles Levy
11. James Chisholm
12. Leonard A. Chesworth

BRIDGEPORT

13. Richard C. Barrett
14. William Lindsay
15. George Eckholm

Alternates

13. Raymond Goral
14. Carl Schaefer
15. Lawrence French

BRITISH COLUMBIA

16. R. Reginald Irwin
17. William J. Marquardt
18. John Vangolen

Alternates

16.
17.
18.

BUFFALO

19. Joseph Ruff
20. John Martin
21. Otto Kirchoff

Alternates

19. Eric Sampson Jr.
20. Rolland Campbell
21. Simon Bush

CAPITOL DISTRICT

22. Frederick A. Infield
23. Wm. Robert Wolf
24. Merle W. Shaw

Alternates

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Day of Month: Fourth Thursday
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Day of Month: Second Tuesday
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Day of Month: First Thursday
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Day of Month: 1st Friday
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Meeting Place: The Center Inn, Albany, N. Y.
Day of Month: First Monday
Time: 8.00 P. M.
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Day of Month: First Tuesday
Time: 7:00 P.M. (Dinner Meeting)
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882 N. Paulina St., Chicago 22, Ill.
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Day of Month: Second Friday
Time: 8:00 P.M.

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The Matchless Metal Polish Co., Chicago, Ill.
The Meaker Co., Chicago 50, Ill.
Mechanical Plating Co., Chicago 22, Ill
Merchants Chemical Co., Inc., Chicago Ill.
Mercil Plating Equipment Co., Chicago , Ill.

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The Modern Plating Co., Chicago 18, Ill.
Modern Plating Corp., Freeport, Ill.
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Platers Technical Service, Inc., Chicago 5, Ill.
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Western Rust-Proof Co., Chicago, Ill.

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817 Sabino Court, Cincinnati 31, Ohio
Meeting Place: Engineering Society Headquarters, Cincinnati
Day of Month: Fourth Wednesday
Time: Dinner 6:30 P.M.—Meeting 7:30 P.M.

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Day of Month: First Friday
Time: 8:00 P.M.

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R. O. Hull & Co., Inc., Rocky River 16, Ohio
Incor, Inc., Cleveland 14, Ohio
The Kelly Plating Company, Cleveland, Ohio
Lorence Plating Co., Cleveland 4, Ohio
The McGean Chemical Co., Cleveland 9, Ohio
National Screw & Mfg. Co., Cleveland 4, Ohio
Pittsburgh Steel Co., Thomas Strip Div., Cleveland 14, Ohio
Platers Supply Co., Cleveland 14, Ohio
R. W. Renton & Co., Cleveland 3, Ohio
Republic Steel Corp., Cleveland, Ohio
Rockwell Spring & Axle Co., Newton Falls, Ohio
Smoothex, Inc., Cleveland, Ohio
Talon, Inc., Meadville, Pa.
True Temper Corporation

COLUMBUS

Secretary: Halvor Christianson
2593 Andover Rd., Columbus 21, Ohio
Meeting Place: Battelle Memorial Institute, Columbus, Ohio
Day of Month: First Friday
Time: 8:00 P.M.

Sustaining Members:
None

DALLAS-FORT WORTH

Secretary-Treasurer: A. C. Fricke
212 Julian St., Dallas 3, Texas
Meeting Place: Lennox Hotel, Grand Prairie, Texas
Day of Month: Third Wednesday
Time: 6:30 P.M.—Dinner—8:00 P.M.—Meeting

Sustaining Members:
Lane Plating Works, Dallas, Texas

DAYTON

Secretary: Richard M. Clinehens
3206 Harwood St., Dayton 10, Ohio
Meeting Place: Hotel Dayton-Biltmore, Dayton, Ohio
Day of Month: Third Wednesday
Time: 8:00 P.M.

Sustaining Members:
Dayton Rust Proof Co., Dayton, Ohio
National Cash Register Co., Dayton, Ohio
Rack Processing Co., Dayton 9, Ohio
Rawac Plating Co., Springfield, Ohio

DETROIT

Secretary-Treasurer: Edward J. Kubis
Wyandotte Chemicals Corp., Wyandotte, Mich.
Meeting Place: Hotel Statler, Detroit, Mich.
Day of Month: First Friday
Time: 8:00 P.M.

Sustaining Members:
Alco Chemical, Inc., Dearborn Mich.
Auto City Plating Co., Detroit 17, Mich.
Automotive Rubber Co., Detroit 28, Mich.
Bruce Products Corp., Howell, Mich.
Buckingham Products Co., Detroit 27, Mich.
Chrysler Corp. (2), Detroit, Mich.
Congress Die Casting Co., Detroit 34, Mich.
Ford Motor Co. (5), Dearborn, Mich.
Formax Manufacturing Co., Detroit, Mich.
General Motors Corporation, Research Staff (5), Detroit 2, Mich.
Grand Steel & Mfg. Co., Clawson, Mich.
Hig ins Rack Coating & Mfg. Co., Hazel Park, Mich.
Hoover Ball & Bearing Co., Adrian, Mich.
Houdaille Industries, Inc. (3), Detroit, Mich.
Howard Plating Industries, Inc., Royal Oak, Mich.
Kaybar, Inc., Birmingham, Mich.
Knight Plating Co., Detroit 7, Mich.
Lyon, Inc., Detroit 28, Mich.
R. C. Mahoney, Detroit 11, Mich.
Master Platers, Inc., Detroit, Mich.
Metal Mouldings Corp., Detroit 28, Mich.
Metal Plating Corp., Oak Park, Mich.
Michigan Chrome & Chemical Co., Detroit 13, Mich.
Midwest Chrome Process Co., Detroit 9, Mich.
George L. Nankervis Co., Detroit 27, Mich.
Nelson Chemicals Co., Detroit 27, Mich.
Northwest Chemical Co., Detroit 4, Mich.
Oakman Manufacturing Co., Van Dyke, Mich.
Plating Inst. of Michigan, Lincoln Park, Mich.
Reed Plating Company, Detroit 11, Mich.
Reilly Plating Company, Melvindale, Mich.
J. J. Siefen Co., Detroit 9, Mich.
Siefen Compounds, Inc., Detroit 38, Mich.
Solventol Chemical Products, Inc., Detroit 3, Mich.
C. D. Sparling Company, Detroit, Mich.
Frederic B. Stevens, Inc. (2), Detroit 16, Mich.
Superior Polishing Company, Van Dyke, Mich.
The Udylite Corp. (3), Detroit 11, Mich.
United Platers, Inc., Detroit, Mich.
Univertical Foundry & Machine Co., Detroit, Mich.
A. T. Wagner Co., Detroit, Mich.
Wagner Brothers, Inc., Detroit 3, Mich.
Whitfield Chemical Co., Detroit, Mich.
Wyandotte Chemicals Corp., Wyandotte, Mich.

GRAND RAPIDS

Secretary: Edwin Krook
1008 S. Ottilia St., S. E., Grand Rapids, Mich.
Meeting Place: Finger's Restaurant
Day of Month: Second Friday
Time: 7:00 P.M.

Sustaining Members:
Dexter Industries, Inc., Grand Rapids 2, Mich.
Doehler-Jarvis Corp., Grand Rapids, Mich.
Expert Coating Co., Grand Rapids, Mich.
Grand Rapids Plating Co., Inc., Grand Rapids 5, Mich.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Hanson-Van Winkle-Munning Co., J. C. Miller Div., Grand Rapids, Mich.
Haviland Products Co., Grand Rapids, Mich.
Jervis Corp., Grandville, Mich.
Keeler Brass Co., Grand Rapids, Mich.
Knape & Vogt Mfg. Co., Grand Rapids, Mich.
Michigan Plating & Stamping Co, Grand Rapids 2, Mich.
F. D. Pace Co., Grand Rapids, Mich
Precision Castings Company of Michigan, Kalamazoo, Mich.
Preston Products Co., Grand Rapids 4, Mich.
Roto-Finish Company, Kalamazoo, Mich.

HAMILTON

Secretary: C. Ross MacLeod
40 W. 3rd St., Hamilton, Ontario, Canada
Meeting Place: Fischer's Hotel, Hamilton
Day of Month: Third Friday
Time: 8:15 P.M.

Sustaining Members:
Behr-Manning, Ltd., Brantford, Canada
Dominion Foundries & Steel, Ltd., Hamilton, Ontario, Canada
Westinghouse Corporation of Canada, Ltd., Hamilton, Ontario, Canada

HARTFORD

Secretary: Stanley Platoz
26 Erwin Place, New Britain, Conn.

Meeting Place: Hotel Bond, Hartford, Conn.

Day of Month: Third Monday
Time: 7:45 P.M.

Sustaining Members:
Arrow Hart & Hegeman Electric Company, Hartford 6, Conn.
W. D. MacDermid Chemical Co., Bristol, Conn.
Royal Typewriter Company, Hartford, Conn.
The Stanley Works, New Britain, Conn.

HOUSTON

Secretary-Treasurer: George King
Turco Products, 1606 Henderson, Houston, Tex.

Meeting Place: Sonny Looks Cafe

Day of Month: Third Tuesday
Time: 6:30 P.M.

Sustaining Member:
Dixie Electro Plating Company, Houston 3, Texas

INDIANAPOLIS

Secretary: Paul B. Freeman
316 N. Wallace St., Indianapolis, Ind.

Meeting Place: Fox's Steak House, 1207 E. Washington St., Indianapolis, Ind.

Day of Month: First Wednesday
Time: Dinner 6:30—Meeting 8:00 P.M.

Sustaining Members:
Arvin Industries, Inc., Columbus, Ind.
P. R. Mallory & Co., Indianapolis, Ind.

KANSAS CITY

Secretary: Robert L. Garrett
3828 E. 9th St. Ter., Kansas City 27, Mo.

Meeting Place: Berkshire Hotel

Day of Month: Second Thursday
Time: 7:00 P.M.

Sustaining Members:
None

LANCASTER

Secretary-Treasurer: Robert Plaisted
Schick, Inc., Lancaster, Pa.

Meeting Place: Varies

Day of Month: Second Friday
Time: 8:00 P.M.

Sustaining Members:
American Wire Fabrics Corporation, Mt. Wolf, Pa.

LOS ANGELES

Secretary: Emmett H. Babcock
1308 E. Alvarado, Pomona, Calif.

Meeting Place: Roger Young Auditorium, 926 W. Washington Blvd., Los Angeles, Calif.

Day of Month: Second Wednesday
Time: Dinner 7:00 P.M.—Meeting 8:00 P.M.

Sustaining Members:
Alert Supply Company, Los Angeles 22, Calif.
Associated Plating Co., Los Angeles, Calif.
The Barber-Webb Co., Inc., Los Angeles 58, Calif.
L. H. Butcher Co., Los Angeles 23, Calif.
Crown City Plating Co., El Monte, Calif.
Hall Mack Company, Los Angeles 7, Calif.
Mefford Chemical Co., Los Angeles 22, Calif.
Millhorn Chemical & Supply Co., Los Angeles 1, Calif.
Modern Plating Co., Los Angeles, Calif.
George E. Nichols Plating, Los Angeles, Calif.
Price Pfister Brass Mfg. Co., Los Angeles 31, Calif.
Rheem Automotive Co., Los Angeles, Calif.
Standard Nickel-Chromium Plating Co., Los Angeles, Calif.
Surface Alloys Engineering Co., Huntington Park, Calif.
Turco Products, Inc., Los Angeles 54, Calif.

LOUISVILLE

Secretary-Treasurer: Frank E. Wilcher Jr.
4 Westport Ter., Louisville 7, Kentucky

Meeting Place: Hasenours Dining & Cocktail Lounge, 1028 Barrett Ave., Louisville, Kentucky

Day of Month: Third Thursday
Time: Dinner 6:30 P.M.—Meeting 8:00 P.M.

Sustaining Members:
American Radiator & Standard Sanitary Corp., Louisville, Ky.

MELBOURNE

Secretary: P. Major
c/o Glen Walker & Co. Pty., Ltd., 11 Waterloo St., Carlton, Australia

Meeting Place: Metallurgy Theatre, Royal Melbourne Tech. College

Day of Month: Third Thursday
Time: 8:00 P.M.

Sustaining Members:
None

MIAMI

Secretary: A. F. Newlander
2201 S. W. 81st Ave., Miami 44, Florida

Meeting Place: Jerry's Restaurant, Lejuene Road, Miami, Fla.

Day of Month: Last Wednesday
Time: 7:30 P.M.

Sustaining Members:
None

MILWAUKEE

Secretary-Treasurer: S. R. Taterzynski
3463 N. Dousman St., Milwaukee 12, Wisc.

Meeting Place: Ambassador Hotel, Milwaukee, Wisc.

Day of Month: First Friday
Time: 8:00 P.M.

Sustaining Members:
Acme Galvanizing, Inc., Milwaukee 15, Wisc.
Allen Bradley Co., Milwaukee 4, Wisc.
Cutler-Hammer, Inc., Milwaukee, Wisc.
Donald Sales & Mfg. Co., Milwaukee 13, Wisc.
Kohler Co., Kohler, Wisc.
Milwaukee Plating Co., Milwaukee 12, Wisc.
John Oster Mfg. Co., Milwaukee 17, Wisc.
Parker Pen Co., Janesville, Wisc.
Perlick Brass Co., Milwaukee, Wisc.
Plating Engineering Co., West Allis 14, Wisc.
Racine Plating Co., Inc., Racine, Wisc.
Square D Company, Milwaukee 12, Wisc.
S. K. Williams Co., Milwaukee 10, Wisc.

MISSISSIPPI VALLEY

Secretary-Treasurer: John Hartman
623 W. 31st St., Davenport, Iowa

Meeting Place: Moline American Legion, Moline, Ill.

Day of Month: Third Wednesday
Time: Dinner 6:30 P.M.—Meeting 8:00 P.M.

Sustaining Members:
Victor Casket Hardware Co., Galesburg, Ill.

MOHAWK VALLEY

Secretary-Treasurer: Carl Fenner
27 South Fifth Avenue, Ilion, N. Y.

Meeting Place: Thompson's Hotel, Utica, N. Y.

Day of Month: Second Thursday
Time: Dinner 6:30 P.M.—Meeting 8:00 P.M.

Sustaining Members:
None

MONTREAL

Secretary-Treasurer: William Glover
754 Second Avenue, Verdune, P. Q., Montreal, Quebec, Canada

Meeting Place: Mount Royal Hotel, 1455 Peel St., Montreal, P. Q.

Day of Month: First Monday
Time: 8:30 P.M.

Sustaining Members:
Alloycraft, Ltd., Westmont, Montreal, Canada
Northern Electric Co., Ltd., Montreal, Quebec, Canada
Union Screen Plate Co. of Canada, Ltd., Lennoxville, Quebec, Canada

NEWARK

Secretary: D. Gardner Foulke
455 Johnston Drive, Watchung, RFD 3, Plainfield, N. J.

Meeting Place: Robert Treat Hotel

Day of Month: Third Friday
Time: 8:15 P.M.

Sustaining Members:

American Smelting & Refining Co., South Plainfield, N. J.
Bell Telephone Laboratories, Murray Hill, N. J.
Corona Corp., Jersey City, N. J.
Frederick Gumm Chemical Co., Kearny, N. J.
Hanson-Van Winkle-Munning Co. (3), Matawan, N. J.
Hy Grade Electro Plating Co., Newark 7, N. J.
Maas & Waldstein Co., Newark 4, N. J.
Royal Plating & Polishing Co., Inc., Newark 4, N. J.
Sel-Rex Corporation, Nutley 10, N. J.

NEW HAVEN

Secretary-Treasurer: Bernard J. Gaffney
573 Skiff St., North Haven, Conn.

Meeting Place: Mason Laboratory—Yale University

Day of Month: Second Tuesday
Time: 8:00 P.M.

Sustaining Members:

Christie Plating Company, Groton, Conn.
Chromium Process Co., Shelton, Conn.
Enthone, Inc., New Haven 2, Conn.
Lycoming Div., AVCO Mfg. Corp., Stratford, Conn.

NEW YORK

Secretary-Treasurer: Milton Nadel
9-05 162nd St., Whitestone 57, N. Y.

Meeting Place: Hotel Statler

Day of Month: Second and Fourth Fridays
Time: 8:00 P.M.

Sustaining Members:

Allied Chemical & Dye Corp., Mutual Chem. Div., New York 16, N. Y.
Allied Chemical & Dye Corp. National Aniline Div., New York 6, N. Y.
American Zinc Institute, New York, N. Y.
Finishing Publications, Inc., Westwood, N. J.
International Nickel Company, Inc. (5), New York, N. Y.
Lea-Ronal, Inc., Jamaica 35, N. Y.
Levco Metal Finishers, Inc., Long Island City 1, N. Y.
Magnuson Products Corp., Brooklyn 2, N. Y.
Metal & Thermit Corp. (2), New York 17, N. Y.
Oakite Products, Inc., New York 6, N. Y.
Sylvania Electric Products, Inc., Flushing, N. Y.

PHILADELPHIA

Secretary: I. William Marcovitch
1302 St. Vincent St., Philadelphia 11, Pa.

Meeting Place: Engineers' Club of Philadelphia, 1317 Spruce St., Philadelphia 7, Pa.

Day of Month: Fourth Monday
Time: 8:00 P.M.

Sustaining Members:

Accurate Electro-Plating, Inc., Philadelphia, Pa.
Aetna Electroplating Co., Inc., Philadelphia 11, Pa.
American Chemical Paint Co., Ambler, Pa.
General Plating Co., Trenton, N. J.
Graham, Savage & Associates, Inc., Jenkintown, Pa.
Leeds & Northrup, Philadelphia 44, Pa.
Pennsalt Mfg. Co., Philadelphia, Pa.
Philadelphia Rust Proof Co., Philadelphia 34, Pa.
Progress Mfg. Co., Inc., Philadelphia 34, Pa.
Radio Corporation of America, Camden 2, N. J.
The Reynolds Co., Philadelphia 32, Pa.
Steel Heddle Manufacturing Co., Philadelphia 32, Pa.

PITTSBURGH

Secretary: W. F. Stevens
Mounted Route No. 7, Ellwood City, Pa.

Meeting Place: Gateway Plaza, Pittsburgh, Pa.

Day of Month: First Wednesday
Time: Dinner 6:30 P.M.—Meeting 8:00 P.M.

Sustaining Members:

Aluminum Company of America, New Kensington, Pa.
Rockwell Spring & Axle Co., Standard Steel Spring Div., Coraopolis, Pa.
Weirton Steel Co., Weirton, West Va.
Westinghouse Electric Corp., East Pittsburgh, Pa.

PORTLAND

Secretary-Treasurer: Dale Tweed, Van Waters & Rogers, Inc.
3950 N. W. Yeon Ave., Portland, Oregon

Meeting Place: Ione Plaza

Day of Month: Open
Time: 6:30 P.M.

Sustaining Members:

None

PROVIDENCE-ATTLEBORO

Secretary: William F. Cahill Jr.
14 Sprague St., Greenville, R. I.

Meeting Place: Providence Engineering Society Building, 195 Angell St., Providence, R. I.

Day of Month: Third Monday
Time: 8:00 P.M.

Sustaining Members:

Gorham Manufacturing Co., Providence 7, R. I.
Walton & Lonsbury, Attleboro, Mass.

ROCHESTER

Secretary-Treasurer: Linwood P. Morrison
1240 Weiland Rd., Rochester 13, N. Y.

Meeting Place: 40 & 8 Club, 933 University Ave., Rochester, N. Y.

Day of Month: Third Monday
Time: 8:00 P.M.

Sustaining Members:

Eastman-Kodak Co. (2), Rochester 4, N. Y.
Stromberg-Carlson Co., Rochester, N. Y.
Taylor Instrument Companies, Rochester, N. Y.
Wollensak Optical Co., Rochester, N. Y.

ROCKFORD

Secretary-Treasurer: E. J. Budden
122 12th St., Rockford, Ill.

Meeting Place: Faust Hotel, Rockford, Ill.

Day of Month: Second Monday
Time: 7:00 P.M.

Sustaining Members:

National Lock Co., Rockford, Ill.

SAGINAW VALLEY

Secretary: Charles Melekian
1857 Hosler St., Flint 3, Michigan

Meeting Place: Zehnder, Frankenmuth, Michigan

Day of Month: Second Wednesday
Time: 7:00 P.M.

Sustaining Members:

None

ST. JOSEPH VALLEY

Secretary-Treasurer: Henry A. Meers
2001 Bergan St., South Bend, Ind.

Meeting Place: Lincoln Highway Inn, Mishawaka, Ind.

Day of Month: First Wednesday
Time: Dinner 6:30 P.M.—Technical Session 8:00 P.M.

Sustaining Members:

Bendix Aviation Corp., Bendix Prods. Div., South Bend 20, Ind.
Rockwell Spring & Axle Co., Mishawaka, Ind.
Roth Plating Corporation, South Bend, Ind.
Standard Plating Works, Inc., Goshen, Ind.
The Studebaker-Packard Corp., South Bend, Ind.

ST. LOUIS

Secretary-Treasurer: Ward W. Kelly
7046 Deerpath Drive, St. Louis 23, Mo.

Meeting Place: York Hotel, 2822 LaSalle St., St. Louis 4, Mo.

Day of Month: Second Wednesday
Time: 7:00 P.M.

Sustaining Members:

American Zinc Sales Co., St. Louis, Mo.
Bussman Mfg. Co., St. Louis, Mo.
Chandeysson Electric Co., St. Louis, Mo.
Davies Supply & Mfg. Co., St. Louis 16, Mo.
Folding Carrier Corp., Oklahoma City, Okla.
C. Hager & Sons Hinge Mfg. Co., St. Louis 5, Mo.
Knapp-Monarch Co., St. Louis 16, Mo.
Lasalco, Inc., St. Louis 4, Mo.
Maurer Supply Co., St. Louis, Mo.
National Rejectors, Inc., St. Louis 15, Mo.
G. S. Robins Co., St. Louis 9, Mo.
Sommers Brothers Mfg. Co., St. Louis 7, Mo.

SAN ANTONIO

Secretary-Treasurer: Robert C. Cripe
2209 Texas Ave., San Antonio, Texas

Meeting Place: DeWinne's Belgium Inn, 3119 W. Commerce St., San Antonio, Texas

Day of Month: Third Monday
Time: Dinner 6:30 P.M.—Program 8:00 P.M.

Sustaining Members:
None

SAN FRANCISCO

Secretary: Arthur E. Schwartz, L. H. Butcher Co.
15th & Vermont St., San Francisco, Cal.
Meeting Place: Pastori's Restaurant, 2550 El Camino Real, Redwood City, Calif.
Day of Month: Second Thursday
Time: 7:30 P.M.

Sustaining Members:
None

SEATTLE-PUGET SOUND

Secretary: William P. Foley
Route No. 1, Box 833, Kent, Wash.
Meeting Place: College Club, 6th & Spring Sts., Seattle, Wash.
Day of Month: Third Tuesday (Flexible)
Time: Dinner 7:00 P.M.—Meeting 8:00 P.M.

Sustaining Members:
None

SOUTHEASTERN

Secretary-Treasurer: Robert H. Probert
1078 Washington St., S. W., Atlanta, Ga.
Meeting Place: Belmont Steak House, Downtown Luckie St., Atlanta, Ga.
Day of Month: Second Friday
Time: 7:30 P.M.

Sustaining Member:
Production Plating Company, Adel, Ga.

SOUTHERN TIER

Secretary-Treasurer: Bill Rossiter
5 Ellen St., Rt. 97, Binghamton, N. Y.
Meeting Place: Ah-wa-ga Hotel, Owego, N. Y.
and
Forest House, Athens, Pa.
Day of Month: Third Tuesday
Time: 7:30 P.M.

Sustaining Members:
International Business Machine Corp., Endicott, N. Y.

SPRINGFIELD

Secretary: Henry L. Heissfeld
74 Chilson St., Springfield, Mass.
Meeting Place: Blake's Restaurant, 15 Market St., Springfield, Mass.
Day of Month: Fourth Monday
Time: Dinner 7:00 P.M.—Technical Session 8:00 P.M.

Sustaining Members:
The Chemical Corporation, Springfield, Mass.
Moore Drop Forging Co., Springfield, Mass.

SYDNEY

Secretary-Treasurer: E. A. McAloon
65 Onslow St., Rosebay, N. S. W., Australia
Meeting Place: Trust Building, Martin Place & Castlereigh St.
Day of Month: Second Thursday
Time: 7:30 P.M.

Sustaining Members:
None

SYRACUSE

Secretary: Milton F. Stevenson
313 Beech St., North Syracuse 12, N. Y.
Meeting Place: Turn Hall, 619 N. Salina St., Syracuse, N. Y.
Day of Month: Third Monday
Time: Dinner 6:30 P.M.—Meeting 8:00 P.M.

Sustaining Members:
Oneida, Ltd., Oneida, N. Y.

TOLEDO

Secretary: Ben Gomersall
6015 Anthony Wayne Trail, Route 1, Maumee, Ohio
Meeting Place: Angelo's Spaghetti House, Stickney Ave., Toledo, Ohio
Day of Month: First Thursday
Time: Dinner Meeting 6:30 P.M.
Business Meeting 8:00 P.M.

Sustaining Member:
The Electric Auto-Lite Co. (2), Sharonville 8, Ohio

TORONTO

Secretary-Treasurer: E. F. Hutt
85 Barford Rd., Rexdale, Ontario, Canada
Meeting Place: Royal York Hotel, Toronto, Ontario, Canada
Day of Month: Second Friday
Time: Dinner 6:30 P.M.—Meeting 8:30 P.M.

Sustaining Members:
Armalite Company, Ltd., Toronto, Ontario, Canada
Bomac Electrotype Co., Ltd., Toronto, Ontario, Canada
British Chrome & Chemicals (Canada) Ltd., Toronto 5, Ontario, Canada
Canada Cycle & Motor Co., Ltd., Weston, Ontario, Canada
Canadian Hanson & Van Winkle Co., Ltd., Toronto, Ontario, Canada
General Motors of Canada, Ltd., Oshawa, Ontario, Canada
Houdaille Industries of Canada, Ltd., Oshawa, Ontario, Canada
International Nickel Co. of Canada, Ltd., Toronto, Ontario, Canada (2)
Lea Manufacturing Co. of Canada, Ltd., Scarborough, Ontario, Canada
Metal & Thermit—United Chromium of Canada, Ltd., Rexdale, Ontario, Canada
W. W. Wells, Ltd., Scarborough, Ontario, Canada

TWIN CITY

Secretary-Treasurer: Robert L. Buckley
205 11th Ave., South, Minneapolis 15, Minn.
Meeting Place: Jax Cafe
Day of Month: First Monday
Time: 7:00 P.M.

Sustaining Members:
None

WATERBURY

Secretary-Treasurer: Albert G. Griffith
94 Ridgeview Place, Cheshire, Conn.
Meeting Place: Colonial Room, Roger Smith-Elton Hotel
Day of Month: Second Thursday
Time: Dinner 6:00 P.M.—Meeting 8:00 P.M.

Sustaining Members:
All Brite Chemical Co., Watertown, Conn.
American Brass Company, Waterbury 20, Conn.
American Electro Products, Inc., Waterbury, Conn.
American Chemical & Refining Co., Waterbury, Conn.
Apothecaries-Hall Co., Waterbury, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Chromium Corporation of America, New York, N. Y.
Eastern Electroplating Co., Terryville, Conn.
Harper Leader, Inc., Waterbury 20, Conn.
The International Silver Co., Meriden, Conn.
The Lea Mfg. Co., Waterbury 20, Conn.
Lux Clock Manufacturing Co., Waterbury, Conn.
MacDermid, Inc., Waterbury 20, Conn.
The Patent Button Co., Waterbury 2, Conn.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Mfg. Co., Seymour, Conn.
The Summit Finishing Co., Inc., Thomaston, Conn.
The Waterbury Plating Co., Waterbury 86, Conn.
Whyco Chromium Co., Inc., Thomaston, Conn.

WESTERN ONTARIO

Secretary-Treasurer: R. A. Campbell
268 Cecil St., Sarnia, Ontario, Canada
Meeting Place: William Pitt Hotel, Chatham, Ontario, Canada
Day of Month: Third Friday
Time: 6:30 P.M.—Dinner-Meeting

Sustaining Members:
Bendix Eclipse of Canada, Ltd., Windsor, Ontario, Canada
Canadian Motor Lamp Co., Ltd., Windsor, Ontario, Canada
Ontario Steel Products Co., Ltd., Chatham, Ontario, Canada

WICHITA

Secretary: Estel E. Starr
1685 Elpyco, Wichita 9, Kansas
Meeting Place: Oriental Restaurant, 5405 E. Central, Wichita, Kas.
Day of Month: Fourth Wednesday
Time: 6:00 P.M.

Sustaining Members:
Continental Can Company, Inc., Coffeyville, Kansas

MESSAGE TO AES
FROM
MAYOR DONALD D. CLANCY

Mayor Donald D. Clancy

CINCINNATI welcomes the 45th Annual Convention of the American Electroplaters' Society and looks forward to your visit.

The Queen City is now recognized by all as Ohio's most progressive city. You will have a chance to see just what this means. Your time will be limited but we hope while you are here you will give yourselves the opportunity to see some of the things we are doing. We know you cannot view them all.

Our extensive expressway system, our new offstreet parking facilities, our gigantic sewage disposal plants, our many street widenings, our slum clearance efforts, new fire and police stations, as well as many other private building projects, all under construction, are designed not only for the convenience and protection of our own people but for our visitors as well.

You will find Cincinnati friendly and receptive to your convention. Our city has excellent facilities to make your visit profitable and enjoyable.

We will leave nothing undone to make your stay in Cincinnati a pleasant, educational and memorable one.

Donald D. Clancy
MAYOR

FOR THE LADIES

Mrs. R. D. Miller

WE WISH to welcome all the ladies to Cincinnati. We have waited a long time to have you visit with us in our "home town." An interesting program has been planned for you, from the traditional Aunt Ella Luncheon on Monday to the Plato Party on Thursday. Something new and different has been arranged for Wednesday at our luncheon at the Sheraton-Gibson.

You will find lots of prizes and surprises in Cincinnati. We are anxious to renew old friendships and make new ones. The committee is waiting to serve you, and make your visit in Cincinnati an enjoyable and happy one. A warm greeting awaits you. See you in May.

Addabelle Miller
CHAIRMAN, LADIES COMMITTEE

WELCOME TO THE 45TH CONVENTION

Charles Wise

FOUR years of preparation have gone into the planning of this convention—four years of effort which we know will be amply repaid by your enjoying one of the finest conventions the AES has ever held. Your enjoyment of the activities planned for you will be just reward to those many members of the Cincinnati Branch who have diligently worked towards the success of this affair.

We want to extend a most cordial welcome to you to the Queen City of the West where we hope your stay will not only be a profitable one from information obtained at the worthwhile Educational Program but also a most enjoyable one in that you will partake of Cincinnati's numerous hospitable recreation highspots.

Your Host Branch wants to do everything possible to make your visit to Cincinnati a pleasant one. Members of the local Branch are so designated with a badge, and will be most happy to assist you in any way if you will direct your questions to them. Don't be afraid to ask them for help.

We hope you will enjoy your stay at the 45th Annual Convention. Have a good time, and go home refreshed spiritually and mentally.

Charles Wise
GENERAL CONVENTION CHAIRMAN

PROGRAM
45th ANNUAL CONVENTION
AMERICAN ELECTROPLATERS' SOCIETY, INC.
Hotel Sheraton-Gibson, Cincinnati, Ohio
May 18-22, 1958

(Unless parenthesized, all events are AES)

SUNDAY, MAY 18

9:00 a.m.	Executive Board Meeting (All Day)	Parlor E
9:00 a.m.–9:00 p.m.	National Association of Metal Finishers (NAMF) Registration	Ballroom Lobby
9:30 a.m.	Annual Meeting of Members (NAMF)	Parlors 7, 8 & 9
1:00–8:00 p.m.	Registration	Ballroom Lobby
1:00 p.m.	Trustees' Meeting, Metal Finishing Suppliers' Assn. (MFSA)	Parlor G
1:30 p.m.	Board of Directors Meeting (NAMF)	Parlor I
4:00 p.m.	Credentials Committee	Parlor E
7:00 p.m.	Local Representatives (NAMF)	NAMF Executive Secretary's Suite
9:00p.m.	Get-Together Party—*Admission by registration book ticket*	Roof Garden

MONDAY, MAY 19

9:00 a.m.–5:00 p.m.	Registration	Ballroom Lobby
9:00 a.m.	Breakfast Meeting, Executive Committees (NAMF and MFSA)	Parlor I
9:00 a.m.–5:30 p.m.	Registration (NAMF)	Ballroom Lobby
10:00 a.m.	Opening Session	Roof Garden
	Invocation—Leonard A. Chesworth, Boston Branch Welcome—Charles Wise, General Chairman Welcome—Mrs. R. D. Miller, Ladies' Chairman Address of Welcome—Hon. Donald D. Clancy, Mayor, City of Cincinnati Remarks—Francis T. Eddy, National President Announcement of the first AES Scientific Achievement Award Winner—Dr. Russel E. Harr, Committee Chairman Keynote Address—Louis Michelson, Manager, Rocket Engines, General Electric Co., Evendale, Ohio	
11:00 a.m.	Business Meeting, Supreme Society	Sheraton Room
11:15 a.m.	Board Buses for Ladies' Luncheon	4th Street Entrance
12:00 noon	Branch Secretaries' Luncheon	Parlors 4 & 5
12:00 noon	Luncheon and Annual Meeting (MFSA)	Ballroom
12:15 p.m.	Speakers' Luncheon	Parlor 6
1:00 p.m.	Ladies' "Aunt Ella" Luncheon, *Sponsored by Oakite Products, Inc., David X. Clarin, Host*, Colony Restaurant (Swifton Village) *Admission by registration book ticket* *Buses leave at 11:15 a.m.*	
1:00 p.m.	Board Buses for Inspection Trip—Cincinnati Milling Machine Co.	4th Street Entrance

Dr. Joseph B. Kushner

Bennie Cohen

Fred T. Hall

J. Zajdowski

Dr. M. H. Jones

Fenton H. Dobb

Robert E. Anderson

Ottis L. Isaacs

Dr. C. M. Tarzwell

Wayne L. Gasper

Fred G. Brune

2:00 p.m. Educational Session—*Admission by badge* ..... Roof Garden

SURFACE PREPARATION (SESSION A)

Chairman—John Holland, Arvin Industries
Educational Committee Representatives:
Malcolm T. Fogg, Globe Chemical Company
Elmer W. Rehme, Metal & Thermit Corporation

1. **THE ROLE OF THE BASIS METAL IN THE PRODUCTION OF STRESSED ELECTRODEPOSITS**
   by Dr. Joseph B. Kushner, Kushner Electroplating School
   The role of basis metal surface condition and cathode deposition film on stresses produced is discussed. Grain size, deposit thickness, magnitude of stresses developed and other factors are covered in the light of recent literature and experimentation. A theory is proposed as an explanation for this behavior.
2. **EFFECT OF SHOT-PEENING PRIOR TO CHROMIUM PLATING ON THE FATIGUE STRENGTH OF HIGH STRENGTH STEEL**
   by Bennie Cohen, Wright-Patterson Air Force Base
   This effect has been studied in an effort to minimize the drastic drop in fatigue strength, approximately 50 per cent, which occurs as a result of chromium plating. Results using various high strength steels will be compared including baked and unbaked conditions.
3. **LOOSE ABRASIVE FINISHING MACHINES**
   by Fred T. Hall, General Motors Corporation
   Equipment has been developed which employs dry, moist or wet slurry abrasive media in a loose or free state. Such equipment is finding widespread usage for finishing decorative parts prior to plating and for deburring, burnishing, blending, or edge radiusing machined parts. Different techniques are used in processing, but normally each involves submerging the parts into bulk abrasive mixture. By various arrangements of moving the article to be finished through the abrasive or by flowing or scrubbing the abrasive over the article, a positive and efficient means of stock removal is obtained.
4. **AES PROJECT NO. 14—THE INFLUENCE OF PHYSICAL METALLURGY AND MECHANICAL PROCESSING OF THE BASIS METAL ON ELECTROPLATING**
   by Dr. Maurice H. Jones and J. Zajdowski, Ontario Research Foundation
   A comparison of the influence of the surface condition of an aluminum killed steel, resulting from various commercial and laboratory polishing techniques, on the durability of a Watts nickel deposit. Several types of mechanical finishing of the basis metal studied include commercial belt polishing with alumina abrasives and laboratory polishing with silica carbide and diamond abrasives.

2:00 p.m. Inspection Trip—Cincinnati Milling Machine Co. (Buses leave about 1:00 p.m.)
2:00 p.m. First Educational Session (NAMF) ..... Sheraton Room
2:30 p.m. Editorial Board Meeting ..... Parlor I
4:30 p.m. Order of Past Presidents, Business Meeting ..... Parlor 7

Dr. A. M. Max

William P. Innes

Edward F. Foley

Bruce E. Scott

Dr. Stanley Zirinsky

6:30 p.m.	Past Presidents' Dinner	Parlor 6
7:00–9:00 p.m.	Registration	Ballroom Lobby
9:00 p.m.	Open House (MFSA)—*Admission by registration book ticket*	Roof Garden

TUESDAY, MAY 20

8:00 a.m.	Membership Committee Breakfast	Parlor H
8:00 a.m.	Speakers' Breakfast	Parlor 6
8:30 a.m.	Golf Tournament (MFSA)	Kenwood Country Club
9:00 a.m.–12:00 noon	Registration	Ballroom Lobby
9:00 a.m.	Public Relations Committee Meeting	Parlor I
9:00 a.m.	Educational Session—*Admission by badge*	Ballroom

WASTE TREATMENT AND DISPOSAL (SESSION B)

Chairman—William J. Neill, Columbus Metal Products, Inc.
Educational Committee Representative:
Dr. R. O. McDuffie, University of Cincinnati

1. **METAL WASTES—CONTRIBUTION AND EFFECT—CINCINNATI METROPOLITAN SEWAGE DISPOSAL SERVICE AREA**
   by Fenton H. Dobb, City of Cincinnati (Sewage Disposal Section)
   The paper deals with a municipality embarking on a sewage disposal program, including an ordinance for control of industrial wastes, especially metal contaminants. Factors such as: inspection, cooperation, and acquisition of information and analyses of industrial wastes from companies in this service area before and after the ordinance was enacted into law is discussed.
2. **ION EXCHANGE AND THE PICKLING OF MAGNESIUM SHEET**
   by Robert E. Anderson, The Dow Chemical Company
   The role of ion exchange in the metal industry is discussed including purification of exhausted or contaminated solutions and recovery and concentration of valuable materials from dilute solutions. An automatic ion exchange process for acetic acid—nitrate pickling of magnesium sheets, showing reduction of costs and labor and improvement of quality control is described.
3. **THE USE OF BIOASSAYS IN THE SAFE DISPOSAL OF ELECTROPLATING WASTES**
   by Dr. Charles M. Tarzwell, Robert A. Taft Sanitary Engineering Center
   A method of predicting the influence of individual components on the toxicity of complex waste water is described. How bioassays can be used to determine what process contributes most to the toxicity of waste water, how it varies and the type and extent of treatment necessary to render it safe for aquatic life is discussed.
4. **INDUSTRIAL WASTE TREATMENT AND WATER RECLAMATION—A CASE STUDY**
   by Wayne L. Gasper, The Maytag Company
   The planning which went into the building of a complete waste treatment facility is discussed, together with the results of three years' experience in industrial waste treatment and the reclamation and reuse of water after treatment. Costs of waste treatment and some of the methods used to reduce costs will be described.

9:00 a.m.	Midwest Regional Council Meeting	Parlor 4
9:00 a.m.–12:00 noon	Registration (NAMF)	Ballroom Lobby
9:30 a.m.	Second Educational Session (NAMF)	Parlors 7, 8 & 9
11:30 a.m.	Board Buses for Coney Island Outing	4th Street Entrance
1:00 p.m.	Annual Outing, East-West Ball Game—*Admission by registration book ticket* *Buses begin leaving about 11:30 a.m.*	Coney Island
6:30–8:00 p.m.	Registration (NAMF)	Roof Garden Mezzanine
7:00 p.m.	Reception & Cocktail Party (NAMF)	Roof Garden
8:00 p.m.	Annual Banquet (NAMF)	Roof Garden

WEDNESDAY, MAY 21

8:00 a.m.	Research Committee Breakfast	Parlor I
8:00 a.m.	Speakers' Breakfast	Parlor 6
9:00 a.m.–12:00 noon	Registration	Ballroom Lobby

Dr. Dodd S. Carr

Henry A. Meers

Dr. H. J. Wiesner

Harold A. Kahler

Wilbur E. Hague

Donald R. Millage

9:00 a.m. **Educational Session—*Admission by badge*** ..... **Ballroom**

SYMPOSIUM ON ELECTROPLATING PRACTICES (SESSION C)

Chairman—Dr. R. O. McDuffie, University of Cincinnati
Educational Committee Representatives:
Ezra A. Blount, Products Finishing
William D. Gordon, MacDermid, Inc.

1. PRINCIPLES OF ELECTROCHEMISTRY

by Fred G. Brune, Chrysler Corporation

Using Faraday's Laws as the basis for electroplating, principles of chemistry and electricity are explained. Ionic action in electroplating solutions is covered to show the changes which occur where electrical energy is used to produce a metallic plate. Other electrochemical properties of electroplating solutions are discussed.

2. FACTORS WHICH INFLUENCE THE STRUCTURE OF ELECTRODEPOSITS

by Dr. Abraham M. Max, Radio Corporation of America

The theory of metallic crystals and the role of imperfections in determining the physical properties of the common metals is surveyed. Factors affecting the character of electrodeposits are discussed including metal ion transition to the crystal lattice of the cathode, co-deposition, crystal formation, and properties of electrolytes.

3. CLEANING, PICKLING AND PREPARATORY SURFACE TREATMENT

by William P. Innes, MacDermid, Inc.

Modern practices in cleaning, degreasing, pickling, and activation of various metals prior to electroplating are discussed. Chemical and physical aspects of cleaning and degreasing and actions of pickling and activation solutions on metal surfaces are covered. Fundamental principles upon which these preplate treatments are based are covered and modern cycles illustrating these operations are outlined.

4. DISCUSSION OF A TYPICAL PLATING SOLUTION—CYANIDE ZINC

by Edward F. Foley, Stratford Chemical Co., Inc.

The cyanide-zinc plating solution is covered thoroughly beginning with a discussion of bath composition (including the various bright plating solutions), purification of the solution prior to use, and operating conditions. Equipment required for zinc plating and engineering considerations connected with this solution are discussed.

9:00 a.m. **Educational Session—*Admission by badge*** ..... **Sheraton Room**

SPECIALIZED FINISHES FOR AIRCRAFT COMPONENTS (SESSION D)

Chairman—Julius Teres, Wright-Patterson Air Force Base
Educational Committee Representative:
William B. Stephenson Jr., General Electric Company

1. ALLOY PLATING SYSTEMS FOR AIRCRAFT ENGINES

by Bruce E. Scott, Curtiss-Wright Corporation

Performance of electro-deposited lead-indium, lead-tin, and silver-lead under high stress and cavitation erosion conditions is evaluated. Use of electroless nickel on aluminum and the increased salt spray resistance of cadmium-tin is discussed. High ambient temperature corrosion protection of nickel-cadmium and characteristics of new alloy systems of copper-tin, silver-tin, and tin-copper are explained.

2. ELECTRODEPOSITED METALLIC AND FLAME SPRAYED CERAMIC COATINGS FOR ELEVATED TEMPERATURES

by Dr. Stanley Zirinsky, General Electric Company, and Dr. Dodd S. Carr, Bart Laboratories & Design, Inc.

Application of heavy nickel and chromium (0.005 to 0.040 in.) to nickel and to copper and over plates of rhodium, platinum, and palladium and flame sprayed alumina are discussed. Reactions of various coatings to a 5000° K plasma jet from a water stabilized arc are evaluated.

W. M. Spurgeon

Hugh V. McGuire

Frank J. Klien

Fremont L. Scott

W. C. Hosford

Samuel S. Frey

3. **HARD ANODIZING OF AIRCRAFT FUEL METERING COMPONENTS**
by Dr. Harold J. Wiesner and Henry A. Meers, Bendix Aviation Corporation
The conditions for applying thin or heavy hard coating to various aluminum alloys are given. Methods of controlling thickness on various sections of complicated shapes are discussed. A statistical comparison of various thickness measurement methods is included.

4. **PITTING IN THICK CHROMIUM DEPOSITS**
by Donald R. Millage and Wilbur E. Hague, The Udylite Corporation
The type of defect that is described as a "catalyst pit" and pitting due to basis metal defects are discussed. Results obtained by drilling a micro-hole in the basis metal and plated with and without a surface-active agent is presented. The effect of surface-active agents upon the porosity of thin plates is included.

9:00 a.m.	**Research Committee Meeting**	**Parlor I**
9:00 a.m.	**Educational Committee Meeting**	**Parlor F**
12:00 noon	**Branch Librarians' Luncheon**	**Parlor H**
12:00 noon	**Ladies' Luncheon—*Sponsored by Products Finishing***	**Roof Garden**
	Mrs. Robert D. Miller, Mrs. William Young, Hostesses	
	Admission by registration book ticket	
12:00 noon	**Speakers' Luncheon**	**Parlor 6**
12:00 noon	**University of Cincinnati Alumni Luncheon**	**Parlor 4**
2:00 p.m.	**Research Committee Meeting**	**Parlor I**
2:00 p.m.	**Educational Session—*Admission by badge***	**Ballroom**

SYMPOSIUM ON ELECTROPLATING PRACTICES (SESSION E)

Chairman—Gerald A. Lux, Oakite Products, Inc.
Educational Committee Representatives:
Ezra A. Blount, Products Finishing
William D. Gordon, MacDermid, Inc.

1. **INSTRUMENTATION**
by Harold A. Kahler, General Motor Corporation
Control instrumentation, in recent years, has given assistance to the electroplater in meeting the exacting demands of specification deposits and lower operating costs. The application, use and merits of instrumentation for large and small installations are reviewed. The advantages of some special electrical and solution control devices are discussed in detail.

2. **DESIGN AND ENGINEERING PROBLEMS IN PLATING ROOM LAYOUT AND INSTALLATION**
by Hugh V. McGuire, McGuire Associates
Factors involved in planning an electroplating installation are discussed including production rate, type of equipment, type of plating, plating cycles, arrangement of equipment, exhaust systems, location of power units, type of heat or cooling equipment, water pre-treatment and/or disposal. Equipment installation details to eliminate operating and maintenance problems will be suggested.

3. **PLATING RACK DESIGN AND INSULATION**
by Frank J. Klein, Rack Processing Company
Various kinds and types of plating racks are discussed including materials used, size, and construction for various types of plating and cycles used. The five principal types of rack coatings used today, methods of application of insulation materials and the relationship between the coating and the type of plating being done is explained.

2:00 p.m.	**Educational Session—*Admission by badge***	**Sheraton Room**

DEVELOPMENTS IN FINISHES AND CONTROLS (SESSION F)

Chairman—William H. Safranek, Battelle Memorial Institute
Educational Committee Representatives:
Lester A. Helmich, Bendix Aviation Corporation
C. Evans Foertmeyer, General Electric Company

1. **WHEN AND HOW TO SELECT AN ORGANIC COATING**
by Harris G. Beck, The Glidden Company
Properties of the various organic finishes and the relation these have to surface pretreatment is discussed. Application of and curing procedures for organic finishes with their features and economics is presented along with suitable testing procedures to enable the engineer to specify and the customer to obtain the finish desired.

2. **VINYL PLASTISOLS AND ORGANISOLS AS PRODUCT FINISHES**
by F. L. Scott and W. C. Hosford, Metal & Thermit Corporation
Polyvinyl chloride plastisols and organisols are finding greatly expanded use in the functional and decorative fields. Wide ranges in the hardness and smoothness of finish are obtainable. These materials exhibit excellent chemical resistance and electrical insulation properties. Application methods include dipping, roller coating, spraying, and forming by molding.

3. **MEASUREMENT OF CHROMIUM PLATE THICKNESS ON MOLYBDENUM ALLOY TURBINE BUCKETS BY X-RAY FLUORESCENCE**
by Dr. William M. Spurgeon and Ottis L. Isaacs, General Electric Co., AGT Div.
Thickness of chromium plate on molybdenum alloy turbine buckets was meas-

John Holland
Chairman Session A

William J. Neill
Chairman Session B

Dr. R. O. McDuffie
Chairman Session C

Julius Teres
Chairman Session D

Gerald A. Lux
Chairman Session E

William H. Safranek
Chairman Session F

ured non-destructively at six different locations. The method used was that of absorption by the plate of the characteristic radiation emitted by the molybdenum substrate. The procedure is suitable for quality control of chromium plate thickness on turbine buckets.

4. **PATTERN PLATING WITH ELECTRODEPOSITS**
by Samuel S. Frey, Oakite Products, Inc.

How definite patterns can be produced upon electrodeposited nickel and thin bright plates deposited over it without loss to the pattern intensity will be shown. The details of time, agitation, temperature, current density and chemical composition of the bath will be discussed. Process details for making these patterns and problems to be solved for commercial applications are covered.

9:30 p.m. — Floor Show and Dance—*Admission by registration book ticket* . . . . . Roof Garden

THURSDAY, MAY 22

8:00 a.m. — Speakers' Breakfast . . . . . Parlor 6

8:30 a.m. — Board Buses for Inspection Trip to American Radiator and Standard Sanitary Co. . . . . 4th Street Entrance

9:00 a.m.–12:00 noon — Registration . . . . . Ballroom Lobby

9:00 a.m. — Business Meeting, Supreme Society . . . . . Sheraton Room

9:00 a.m. — Educational Session . . . . . Ballroom

PANEL DISCUSSION—"PRACTICAL PLATING PROBLEMS" (SESSION G)

Chairman—Dr. Abner Brenner, National Bureau of Standards

Educational Committee Representative:
Robert L. Winston, Electric Auto-Lite Company

PANEL MEMBERS:

Dr. A. Kenneth Graham, Graham, Savage & Associates, Inc.:
PREPARATION OF BASE METAL AND DECORATIVE PLATING

Dr. Harold J. Read, Pennsylvania State University:
CORROSION

Lloyd O. Gilbert, Rock Island Arsenal:
CONVERSION COATINGS AND MILITARY REQUIREMENTS

F. Keller, Aluminum Company of America:
ANODIZING AND PLATING ON ALUMINUM

Harold F. Smith, The Smith Electrochemical Company:
SPECIALTY WORK, JOB SHOP OPERATION

Fremont L. Scott, Metal & Thermit Corporation:
ORGANIC COATING

9:30 a.m. — Inspection Trip—American Radiator and Standard Sanitary Co., Plumbing and Heating Division *Buses leave at 8:30 a.m.*

12:00 noon — Ladies' Luncheon—*Sponsored by Udylite Corp., Dr. R. B. Saltonstall, Host—Admission by registration book ticket* . . . . . Pavillion Caprice, Netherland Hilton

12:00 noon — Board Buses for Electric Auto-Lite, Sharonville, plant . . . . . 4th Street Entrance

1:00 p.m. — Inspection Trip—Electric Auto-Lite Co., Sharonville Div. Buffet lunch will be served at the plant courtesy of the Electric Auto-Lite Co. Buses leave at 12 noon

2:00 p.m. — Business Meeting, Supreme Society . . . . . Sheraton Room

2:00 p.m. — Ladies' Plato Party—*Mrs. Joan T. Wiarda, Hostess* . . . . . Pavillion Caprice, Netherland Hilton

7:00 p.m. — Annual Banquet and Dance—*Registration book ticket must be exchanged for banquet ticket prior to Wednesday noon* . . . . . Hall of Mirrors, Netherland Hilton

FRIDAY, MAY 23

8:00 a.m. — President's Breakfast for National Officers and Wives . . . . . (To be announced)

10:00 a.m. — Executive Board Meeting (All Day) . . . . . Parlor E

Dr. Harold J. Read

Dr. A. K. Graham

Dr. Abner Brenner

Lloyd O. Gilbert

Fred Keller

Harold F. Smith

M. M. Beckwith
President

E. W. Couch
1st Vice President

R. F. Ledford
2nd Vice President

F. P. Green
3rd Vice President

T. A. Trumbour
Treasurer

METAL FINISHING SUPPLIERS' ASSOCIATION

HOTEL SHERATON-GIBSON, CINCINNATI, OHIO

A. P. Munning
Executive Secretary

MAY 18—SUNDAY

2 p.m.—Board of Trustees Meeting — PARLOR G

MAY 19—MONDAY

12 Noon—Luncheon and Annual Meeting — BALLROOM

9 p.m.–1 a.m.—Open House—Dancing and Buffet Supper — ROOF GARDEN

Barney Rapp's Band

MAY 20—TUESDAY

8:30 a.m.—Golf Tournament—Kenwood Country Club. Two 18-hole courses. Green Fee $5.00. Outing tickets honored for lunch at the club.

J. J. Duffy Jr.
Past President

NATIONAL ASSOCIATION OF METAL FINISHERS

HOTEL SHERATON-GIBSON, CINCINNATI, OHIO

MAY 18—SUNDAY

9:00 a.m.–9:00 p.m.—Registration	BALLROOM LOBBY
9:30 a.m.—Annual Meeting of Members	PARLORS 7, 8 & 9
1:30 p.m.—Board of Directors Meeting	PARLOR I
7:00 p.m.—Meeting, Representatives of NAMF Locals	EXECUTIVE SECRETARY'S SUITE

MAY 19—MONDAY

9:00 a.m.–5:30 p.m.—Registration	BALLROOM LOBBY
9:00 a.m.—Breakfast-Meeting, NAMF and MFSA Executive Comm.	PARLOR I
2:00 p.m.—1st Educational Session and Management Seminar	SHERATON ROOM

MAY 20—TUESDAY

9:00 a.m.–12 noon—Registration	BALLROOM LOBBY
9:30 a.m.—2nd Educational Session and Management Seminar	PARLORS 7, 8 & 9
6:30 p.m.–8:00 p.m.—Registration	ROOF GARDEN MEZZ.
7:00 p.m.—Cocktail Party & Reception	ROOF GARDEN
8:00 p.m.—Annual Banquet	ROOF GARDEN

Speaker: Fay Le Meadows
Topic: "A Plater's Life Can Be Fun."

John Palik Jr.
President

Harold W. Baker
2nd Vice President

Webster B. Knight
2nd Vice President

Frank Kaiser
Secretary-Treasurer

Sal Novelli
Ass't. Secretary-Treasurer

P. Peter Kovatis
Executive Secretary

CONVENTION CHAIRMEN

Mrs. R. D. Miller
Ladies

Charles Wise
Convention
General Chairman

E. A. Blount
Convention
Co-Chairman

R. E. Winterman
Program

W. W. Loveless
Hotel

THE AMERICAN ELECTROPLATERS' SOCIETY

CONGRATULATES AND THANKS

WHEN THE FOUNDING FATHERS of the American Electroplaters' Society, Inc. (AES) formulated that infant structure practically a half-century ago, one of the first activities written into the Society's blueprint was the conduct of a convention. In time, that dream came true and the AES conducted its first Annual Convention in New York in 1913 with then-President Charles H. Proctor presiding.

Nine years later—in 1922 when President Warren Gamaliel Harding, an Ohioan, occupied the White House and the U.S.A., in that frenzied era, boasted a population of nearly 110 million—the growing AES, pursuing its "thousandth member," held its Tenth Annual Convention in Cincinnati, the handsome city on the shores of the "Beautiful Ohio."

May 18–22 in 1958 will find a large, matured and still growing AES returned to Cincinnati for its 45th Annual Convention. Now composed of 7832 globally domiciled members compared with less than a thousand in '22—currently boasting 58 Branches as against 23 in that early year of the zestful "Twenties"—the AES expects and, from every indication, will get a banner Convention in that thriving municipality from its industrious Cincinnati Branch.

To the civic leaders who are welcoming the AES to their community—to the officials of Cincinnati's hotels who will house AES's large numbers—to the officers and members of the AES's enthused and experienced Cincinnati Branch who are hosting this sizable AES enterprise—to the fine industrial companies that are providing hospitality—to the leadership and personnel of the able and effective Convention Committee—to all these plus the learned men who will share their knowledge with AES's members attending the Educational Sessions—the Supreme Society, the Executive Board, the staff express a hearty "thank you."

And to AES's attending membership, may your cup overflow with technical and scientific knowledge, and may you have much fellowship and fun, Zinzinnati style.

E. Roof
Registration

S. Chipman
Entertainment

A. R. Waters
Banquet

L. A. Critchfield
Coordination

L. J. Howald
Publicity

R. K. Rarick
Finance

R. A. Barry
Plant Visitation

W. B. Stephenson Jr.
Educational
Co-Chairman

R. D. Miller
Educational

Mrs. W. Young
Ladies Co-Chairman

A. J. Gerada
Athletic

AES NEWS

DELEGATES' TENURE NOW STANDARD AND PRESCRIBED

Accredited Delegates will stream into Cincinnati from near and distant places in the United States and Canada, including, expectedly, H. I. Littauer representing the Melbourne (Australia) Branch.

The tenure of these Delegates spans, under the Bylaws as amended by the Supreme Society, June 20, 1957, from the first Branch meeting following the Montreal Annual Meeting in June 1957 to the first Branch meeting immediately following this Cincinnati Annual Meeting.

A return sheet, signed both by the Branch President and Branch Secretary, identifying and certifying duly elected Branch Delegates and Alternates is due in the hands of the National Executive Secretary by not later than November 3, 1958 from each of the AES's 58 Branches.

Upon accreditation by the Credentials Committee, these will then serve from the first Branch meeting after this Cincinnati Annual Meeting to the first Branch meeting immediately following the Detroit Annual Meeting to be held June 19, 1959.

BOSTON BRANCH WINS MEMBERSHIP EXPANSION COMPETITION

The Boston, Cincinnati and the Kansas City Branches prevailed in their respective divisions in the AES Annual Branch Membership Expansion Competition for the twelve-month period ending March 31, 1958. Accordingly, an award of $50 will be presented at the 45th Annual Convention in Cincinnati to each of the winning Branches for achieving the greatest membership expansion during the fiscal year in their respective divisions.

Meantime, the Society's aggregate membership, in all categories including Sustaining Memberships, mounted to a record 7832 on March 31, 1958 compared with 7541 members that same date the year before.

For the 1957–1958 year ending March 31, 1958 (according to records on hand at National Headquarters on that day) the five leaders in the AES's respective divisions were:

Branch	Members April 1, 1957	Plus New Members 1957-1958	Net Change Membership (A)	Per Cent Change
First Division (126 Members and Over)				
1. Boston	148	29	+24	+16.2
2. Detroit	681	112	+57.5	+ 8.4
3. Philadelphia	235	23	+17.5	+ 7.45
4. Hartford	173	17	+11	+ 6.4
5. New York	345	29	+20	+ 5.8
Second Division (70-125 Members)				
1. Cincinnati	106	19	+16.5	+15.6
2. St. Louis	99	20	+13	+13.1
3. Southeastern	82	14	+ 8.5	+10.4
4. Montreal	107	25	+10.5	+ 9.8
5. Columbus	72	17	+ 7	+ 9.7
Third Division (10-69 Members)				
1. Kansas City	44	18	+18.5	+42.1
2. Hamilton	33	15	+13	+39.4
3. San Francisco	69	10	+12.5	+18.1
4. Mississippi Valley	60	16	+10.5	+17.5
5. Southern Tier	39	8	+ 5.5	+14.1

(A) After reconciling "New," "Reinstated" and "Transferred In" members with "Resigned," "Suspended," "Died" and "Transferred Out" members. Net Change is computed by rating "Transfers" at .5.

NEARLY HALF OF AES BRANCHES NOW REGIONALIZED

Regionalization of AES Branches has made notable progress during 1957–1958 as evidenced by the fact that five such regions now exist encompassing 26 of the Society's current 58 Branches compared with three regions composed of 16 Branches a year ago. These now include:

Region	Branches
Dixie:	Blue Ridge
	Miami
	Southeastern
Empire State:	Buffalo
	Capitol District
	Mohawk Valley
	Rochester
	Southern Tier
	Syracuse
Midwest:	Chicago
	Milwaukee
	Mississippi Valley
	Rockford
	St. Joseph Valley
	St. Louis
	Twin City
New England:	Bridgeport
	Hartford
	New Haven
	Springfield
	Waterbury
Tri-State:	Cincinnati
	Columbus
	Dayton
	Indianapolis
	Louisville

The Midwest Regional Council is expected to complete its organization and to progress toward finalization at a meeting at the 45th Annual Convention, Cincinnati, to be held in Parlor 4, Sheraton-Gibson Hotel, Tuesday, May 20 starting at 9 a. m.

HIGHEST AES AWARD WINNER TO BE NAMED IN CINCINNATI

The first winner of the AES Scientific Achievement Award, this Society's highest honor, will be announced at the Opening Session of the 45th Annual Convention, Cincinnati, Monday forenoon, May 19.

That winner will deliver the first "William Blum Lecture" at the AES's Golden Jubilee Convention in Detroit in June 1959.

The full story will be told in June PLATING.

Manuel Ben

Howard J. McAleer

Wright Wilson

Walter L. Pinner

Myron B. Diggin

Dr. R. B. Saltonstall

AES GOLDEN JUBILEE PLANS PROGRESSING

The AES's Fiftieth Anniversary observance will be climaxed in 1959 by the Golden Jubilee Convention and Industrial Finishing Exposition to be held in Detroit from June 14 through June 19, 1959 with the AES's Detroit Branch as host.

A feature of the Golden Jubilee will be the Fifth International Conference on Electrodeposition and Metal Finishing. The Conference, as the Educational Sessions element of the Convention, will cover a five-day period and is presently being planned to include at least thirty technical and scientific papers which will be delivered by authorities from the United States and many other countries.

At one of these Sessions, the first winner of the AES's new Scientific Achievement Award, now the Society's highest award, will deliver the first "William Blum Lecture." The identity of this stalwart will be announced by the "AES Scientific Achievement Award Committee" at the Opening Session of the Cincinnati Convention, May 19, 1958.

The Industrial Exposition, first since the successful Cleveland Exposition of 1955, will provide site for the display and demonstration of modern equipment, processes and materials in use in the metal finishing industry. Cooperating in this effort, it is conservatively estimated, will be over 175 participating companies using floor space in excess of 60,000 square feet. It is expected that the Exposition will attract at least 10,000 visitors.

Additionally, the Golden Jubilee will provide an opportunity for its guests from farflung places to visit certain important manufacturing plants in the Detroit area, where they will witness the operations which result in Detroit.

Wright Wilson heads the Golden Jubilee Convention as General Chairman. At the helm of the Exposition is Howard J. McAleer as General Chairman with Manuel E. Ben as Co-Chairman. Walter L. Pinner is Chairman of the Fifth International Conference aided as Vice Chairmen by Dr. Richard B. Saltonstall and Myron B. Diggin.

CONVENTION KEYNOTE SPEAKER TO DISCUSS VANGUARD MISSILE

Louis Michelson, manager of Rocket Engines, Flight Propulsion Laboratory, General Electric Co. since 1955, will give the Keynote Speech for the 45th Annual Convention of the American Electroplaters' Society. Mr. Michelson will mount the speakers' stand at the Sheraton-Gibson Hotel (convention headquarters) in Cincinnati on Monday morning, May 19.

The General Electric executive's topic is one of great current interest, "The Propulsion Requirements for the Vanguard Missile." Rocket-engine maker Michelson will discuss the whole concept of the earth satellite, tell how a three-stage missile is built, what makes the first stage engine roar. He will illustrate his talk with slides of the first-stage compartment and movies of the first successful Vanguard launching.

The AES Keynoter is a native of Lynn, Massachusetts, graduated from the Massachusetts Institute of Technology with a BS in physics. Since then he has had an interesting career.

Mr. Michelson began his distinguished scientific career at the Corning Glass Works, Corning, N. Y., in 1940, soon found himself in the position of chief physicist of the Submarine Mine Depot, Ft. Monroe, Virginia. During his World War II stay here he did research on underwater listening and detection systems for harbor defense, was awarded the Army Commendation Ribbon for measurement of influence fields and for development of a new type submarine detection system.

Louis Michelson

Immediately after the war Mr. Michelson worked as an electronics engineer for Sanborn Instrument Co. and was chief engineer and then general manager of Allied Cement and Chemical Co., Lynn, Mass.

In 1947, Mr. Michelson returned to Washington to establish the Army Ordnance Submarine Mine Laboratory, which was later turned over to the Navy, at which time he became chief of the Mine Division, Naval Ordnance Laboratory. In this capacity, Mr. Michelson organized and directed the Navy's program of research and development on submarine surface ship-laid and aircraft-laid mines.

In the four years prior to his present position, the Keynote Speaker was technical director of the US Naval Ordnance Station, Newport, Rhode Island, was responsible for development of all submarine-and surface-launching torpedos and torpedo tubes.

FIVE BRANCHES TO OBSERVE THEIR ANNIVERSARIES IN 1959

As the AES observes its Fiftieth Anniversary in 1959, five of its Branches will also be celebrating key anniversaries, namely Pittsburgh (Fortieth); Baltimore-Washington and Los Angeles (Thirtieth) and Allentown-Reading and Hamilton (Twentieth).

PREVIEW OF FUTURE PLATING ISSUES

●

JULY 1958

POST CONVENTION ISSUE. Among other features, it will contain a pictorial and narrative account of the 45th Annual Convention.

●

AUGUST 1958

WATER AND WASTE TREATMENT. Another edition of this informative and popular feature.

●

NOVEMBER 1958

AIRCRAFT. Electroplating and metal finishing in the aviation industry will be featured in this second annual edition.

●

THE JUNE, SEPTEMBER, OCTOBER and DECEMBER issues loom as strong 1958 General Issues.

●

JANUARY 1959

ABRASIVES AND MECHANICAL FINISHING. Developments in the various finishing methods will be featured in this annual issue.

DETROIT BRANCH STAG DAY JULY 26

The 1958 AES Detroit Branch Stag Day Committee has completed arrangements for its annual summer entertainment event.

Over the succeeding years, the Stag Day has provided a day of fun and relaxation for an ever-increasing number of visiting Branch members along with the members and guests of the Detroit Branch.

This year the Committee has obtained a new location for the outing—the fabulous new Hillcrest Country Club, just a few miles north of Detroit at Mount Clements, with its modern, tri-level club house, 18-hole championship golf course and Olympic-size swimming pool.

Golf is the feature attraction, however, a full day of sports and games will be provided for all, including archery, bait casting, baseball, tug-o-war, and many other sports with numerous prizes awarded in each event and door prizes to everyone.

Free breakfast is served to the early bird golfers and dinner for all from 4:00 to 7:30 p.m.

The full day of fun is promised for $8.50 per person.

For tickets and further details, write or phone John Hitchcock, c/o E. I. du Pont De Nemours & Co., Inc., 13000 W. Seven Mile Road, Detroit 35, Michigan, Telephone UNiversity 4-1963.

Checks should be made payable to AES Detroit Branch Stag Day.

AES BOARD AND COMMITTEE MEETINGS AT 45TH ANNUAL CONVENTION

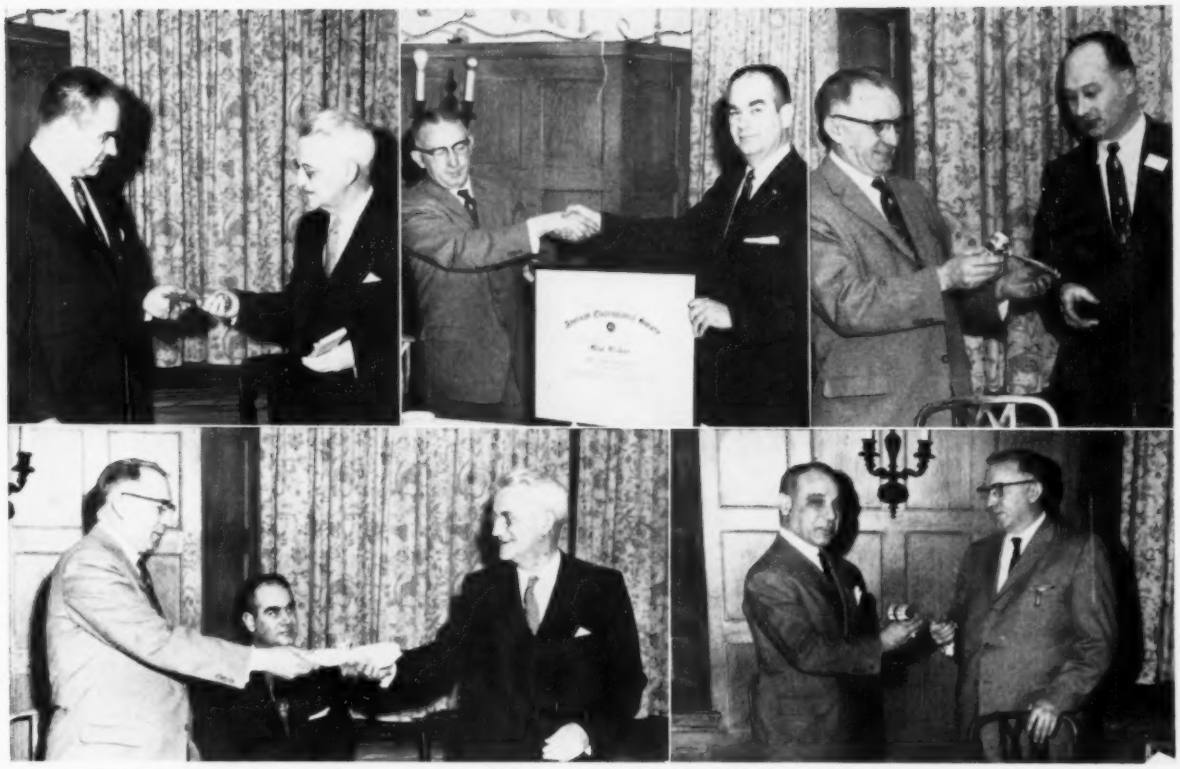
	Parlor	Presiding
SUNDAY, MAY 18		
9 a.m. Executive Board	E	Francis T. Eddy
4 p.m. Credentials Committee	E	Edward A. Bruck
5 p.m. Scientific Achievement Award Committee	E	Dr. Russel E. Harr
MONDAY, MAY 19		
12 p.m. Branch Secretaries	4 & 5	John P. Nichols
2:30 p.m. Editorial Board	I	John P. Nichols
2:30 p.m. Constitutional & By-law Revision Committee	E	Dr. W. A. Wesley
4:30 p.m. Past Presidents	7	Walter L. Pinner
TUESDAY, MAY 20		
8 a.m. Membership Committee	H	Manuel Ben
9 a.m. Public Relations Committee	I	Frank Tirendi
9 a.m. Midwest Regional	4	Leslie L. Diveley
WEDNESDAY, MAY 21		
9 a.m. Research Committee	I	Robert A. Ehrhardt
9 a.m. Educational Committee	F	Dr. Dodd S. Carr
12 p.m. Branch Librarians	H	Herberth E. Head
2 p.m. Research Committee	I	Robert A. Ehrhardt
FRIDAY, MAY 23		
10 a.m. Executive Board	E	New President

BRANCHES HARNESSING 15-MONTH PER CAPITA TAX BILLING

As a result of recent Supreme Society enactments announced to all Branches by direct mail and published in April 1958 PLATING, the following action is now mandatory:

1. **Each Branch Secretary is required to provide the National Executive Secretary with a complete and correct list of his Branch's members in good standing as at March 31, 1958. Deadline date was April 15, 1958. If not yet sent for any reason, immediate submission is of the essence.**
2. **Promptly upon receipt (and predicated upon the Branch's list received), National Headquarters will provide each Branch with an invoice for 15-months per capita taxes due it covering the period from April 1, 1958 through June 30, 1959. The billed rate will be $7.13 per member (this being $5.70 per member for the usual four fiscal quarters plus a fifth quarter at $1.43 per member).**
3. **In billing its own members, each Branch will send an accompanying letter explaining 1) that no dues increase is involved and 2) emphasizing that this 15-month billing period is merely a one-time expedient necessary to adjusting the AES to its new July 1-June 30 fiscal year.**
4. **Though each Branch will have to December 1, 1958 to pay its per-capita taxes in full to National Headquarters for the indicated 15-month period, every possible effort should be made to pay in full by September 1, 1958.**
5. **Membership cards covering this 15-month billing period have already gone to each Branch from National Headquarters. These should be issued by Branch Secretaries to their Branch Members as they pay these 15-month per capita taxes.**

The Society appreciates the enthusiastic cooperation being extended by all concerned in enabling it to adjust effectively to its new fiscal year. The end-result will justify these necessary means.



(Top, left) Mayor Walter L. Young of Roanoke, Virginia, presents the Key to the City to National President Francis T. Eddy. (Top, center) Branch President T. R. Boggess, left, accepts the Blue Ridge Branch's Charter from National President Francis T. Eddy. (Top, right) From a grateful and admiring Branch and from his business associates, Branch President Ted Boggess is surprised with a handsome silver gavel. Branch Secretary Carl A. Witherspoon at right. (Bottom, left) Roanoke's Mayor Walter L. Young, right, receives a silver gavel from Branch President T. R. ("Ted") Boggess. Onlooker is National President Eddy. (Bottom, right) National Executive Secretary John P. Nichols, left, awarded an inscribed silver gavel. Branch President Boggess makes the presentation.

BLUE RIDGE BRANCH INSTALLED AS AES's 58th BRANCH

With television cameras grinding and news cameras flashing, National President Francis T. Eddy presented to Branch President T. R. Boggess its framed charter thereby installing the Blue Ridge Branch as the 58th chartered affiliate of the American Electroplaters' Society, Inc. (AES) at a gala dinner meeting held at the Patrick Henry Hotel, Roanoke, Virginia, Friday evening, March 28.

Attended by a packed roomful of Branch members and guests, including Arthur G. Pierdon representing the Baltimore-Washington Branch, the meeting earlier had heard Roanoke's Mayor Walter L. Young extol and welcome the infant Blue Ridge group. He gave special meaning to his message, moreover, by awarding the traditional key to the city to National President Eddy. In turn, Branch President Boggess presented a silver gavel to the Mayor who, in accepting, said that he will hereafter use it in conducting the meetings of the municipality's City Council with good memory of the AES.

A handsomely inscribed silver gavel was also presented to John P. Nichols, AES's Executive Secretary and PLATING's publisher. And from his Branch and his business associates, Branch President Boggess himself received a surprise silver gavel midst hearty applause by an enthusiastically assenting assembly.

Local NBC Station Telecasts Program

Following a sumptuous dinner, and with Bruce Wallace, Branch Second Vice President, serving as Toastmaster, Branch President Boggess opened the evening's program with a warm welcome to the assembly. Mayor Young was next introduced and his remarks and presentation were followed by a brief synopsis of the background and biography of the new Branch by Branch First Vice President Nelson F. Murphy and Branch Secretary-Treasurer Carl A. Witherspoon Jr.

Executive Secretary Nichols then highlighted the Branch's responsibility and relationship with the Supreme Society, Executive Board and Headquarters.

Introduced next, National President Eddy presented the traditional installation welcome of the AES to the newly chartered Branch, and impressively delivered to it, its permanent charter.

Branch President Boggess's acceptance gave way, in turn, to the introduction of the Branch's Delegates/Alternates, and to their briefing as to duties by Mr. Eddy. These included Delegates Nelson F. Murphy, C. R. Hudgins, John E. Mungenast, and Alternate Delegates Howard R. Welfare, Paul D. Callahan and Mr. Boggess.

The meeting ended with a lively half-hour question and answer period on National and Branch subjects. Among participants were the Branch's Board of Managers, including Thomas L. Johnson, Howard Weaver and Howard R. Welfare.

The event was telecast on Ed Thomas "Eleven O'Clock News" (Shell Oil Company sponsorship) over WSLS-TV-NBC, Roanoke, Channel 10. It also had wide radio coverage.

INTERSOCIETY NEWS

GUIDED MISSILES DIRECTOR SPEAKS TO ASTM

An address by William M. Holaday, director of Guided Missiles for the Department of Defense, highlighted the ASTM Committee Week program at the Hotel Statler, St. Louis, Feb. 10–14. Mr. Holaday spoke at the banquet sponsored by the St. Louis District of ASTM on Wednesday evening.

Two industry luncheons, an innovation at ASTM Committee Week, were also held. On Tuesday noon, Feb. 11, Nicholas P. Veeder, president of the Granite City Steel Co., was the speaker at the Steel Industry Luncheon sponsored by ASTM Committee A-1 on Steel.

Dr. Carroll A. Hochwalt, vice-president, research, development and engineering, Monsanto Chemical Co., was the speaker at the Chemical Industry Luncheon sponsored by ASTM Committees D-11 on Rubber and Rubber-Like Materials and D-24 on Carbon Black, on Wednesday, Feb. 12.

Thirty-five of ASTM's technical committees held about 280 committee and subcommittee meetings during the week. For the intensive work of their committees, 1135 technical men registered to discuss and correlate the research upon which ASTM specifications and methods of test are based.

Mr. Holaday, told the audience of about 300 at the Committee Week Dinner that our missile work began in earnest a little over a decade ago—just about the end of World War II, with austere beginnings. Since then the progress and the national expenditures from guided missile developments and production has been astounding. In 1947 total money obligated on missiles was $58 million, and in 1959 the projected obligation will be $5.8 billion—exactly 100 times as great as in 1947.

ST. LOUIS MEETING OF ASTM, COMMITTEE A-5

The semi-annual meeting of Committee A-5 of ASTM took place in St. Louis, Missouri, on February 14, 1958. Some of the items discussed and acted upon by the various Subcommittees are given below.

Subcommittee VII—Methods of Testing

A tentative procedure for determination of weight of coating of aluminum coated articles was presented to the membership. Several modifications were suggested and incorporated in the procedure. If approved by A-5 the procedure may be included in the 1958 Book of Standards.

The Chairman reported that a report on magnetic methods will be forthcoming by the June meeting.

Subcommittee XI—Sheet Specifications

Specifications A93, A308, and A361 had been approved by A-5, but in view of the issuance of a new Carbon Steel Sheet Manual by AISI in November 1957, a Task Force was appointed to review these specifications for inclusion in the 1959 Book of Standards.

It was voted to request authorization of A-5 Advisory Subcommittee to write two specifications, one for Galvanized Sheets of Structural Quality, and for Galvanized Sheets for Culverts, Underdrains, and Arches. These actions were approved at the Advisory meeting on February 14.

A proposed British Standard for continuously coated galvanized sheets submitted by ASA for comment was reviewed and comments will be forwarded to ASTM Headquarters.

Subcommittee XII—Wire Specifications

Due to the absence of the various Section Chairmen, no reports were made on the various assignments.

The Subcommittee recommended the re-affirmation of Specifications A 111–52 and A 326–52, and also the advancement to Standard of A 363–55T and A 390–56T.

The Subcommittee was informed that Specifications A 116–57 and A 121–27 have been accepted by ASA as American Standards.

Subcommittee XIII—Hardware Specifications

A brief review of the six specifications follows:

A384–386–55T are generally in good shape and could be issued for letter ballot for advancement to standard.

A123–53 Tower Steel. From the results of many tests and known practices by several fabricators and galvanizers, it is believed that the average and minimum values of coating weights can be raised from 2.0 and 1.8 oz to higher values.

A143–46 Embrittlement of Steel. Several changes in wording, mostly of an editorial nature, are planned.

A153–53 Hardware The chairman reviewed by means of distribution curves the range of coating weights for the various classes of materials now given in Table I. Data from several thousand tests indicate that it is reasonable to call for heavier average coatings for a few of the classes. Several new subclasses may be introduced.

A special meeting will be called to pass on the many changes necessary to bring the specifications up to date, in time for inclusion in the 1958 Book of Standards.

Subcommittee XVI—Hardware Tests

A preliminary report will be prepared, covering in detail the preparation phase, inclusive of the surface condition of each specimen, method of cleaning and thickness and appearance of coating. It was pointed out that, particularly in the case of the hot dip zinc specimens, the required thickness of coating of about 1.5 oz/sq ft was considerable less than could normally be applied, and that, therefore, the weathering of such coatings should be viewed in the proper perspective.

The Chairman of the special committee on nuclear problems reported on the activities of his group.

Subcommittees XIV and XV held no meeting.

A. Mendizza,
AES Liaison to A-5, ASTM

STUDIES ON CADMIUM-PLATED STEELS REPORTED

Mysterious fractures of high-strength steels which are used in modern jet planes and rockets have been explained by researches of a Case Institute of Technology metallurgist.

In a speech before the National Association of Corrosion Engineers in San Francisco on March 21, Dr. Alexander R. Troiano, professor and chairman of Case's department of Metallurgical Engineering, reported on studies of high strength steels which are cadmium-plated to prevent corrosion.

While these steels originally have been shown to be able to withstand forces of 225,000 to 275,000 lb/sq. in., they have been subject to mysterious fractures when exposed to far less loads. The fractured parts, when tested, have shown the original high-strength characteristics.

As a result, although cadmium plating is perhaps the best way to keep steel from rusting, the brittleness of high-strength cadmium-plated steels have greatly handicapped their use.

Dr. Troiano's studies have shown that hydrogen, trapped in the metal during the pickling and plating process is responsible for the brittleness of the steel.

The hydrogen can be removed if the plating is stopped when it reaches a thickness of 0.001 in., and the metal is then baked to drive out the remaining hydrogen. Following this treatment, any thickness of cadmium plate can be deposited on the steel with no danger of subsequent failure.

MARBURG AND GILLETT LECTURERS AT BOSTON ASTM MEETING

Elmer Walter Pehrson, chief, Division of Foreign Activities of the U.S. Bureau of Mines, will present the annual Edgar Marburg Lecture at the 61st Annual Meeting of the American Society for Testing Materials, Hotel Statler, Boston, Mass., Wednesday afternoon, June 25.

This annual lecture is a memorial to the first secretary of ASTM and was established to emphasize the importance of furthering the knowledge of properties and testing of engineering materials.

Clyde Williams, former president of the Battelle Memorial Institute and now president of Clyde Williams and Co., industrial research and management advisory firm, will present the 6th Gillett Memorial Lecture on Tuesday, June 24, at 5 p.m.

This lecture, jointly sponsored by ASTM and Battelle Memorial Institute, commemorates Horace W. Gillett, first director of Battelle and one of this country's leading metallurgists. Each year it covers a subject pertaining to the development, testing, evaluation, and application of metals.

JOB SHOP NAMF HARD CHROME STANDARDS

The first in a series of steps to formulate and set job shop plating standards was taken this month by the National Association of Metal Finishers. Action followed a recent recommendation by the Cleveland NAMF affiliate, the Plating Trades Association of Ohio, to set standards for hard chrome plating.

Greater standardization and improved plating quality by firms adhering to NAMF standards are two of many benefits that will accrue, according to NAMF standards committee chairman Philip J. Ritzenthaler of Milwaukee.

Approved by the NAMF executive committee recently were the following standards and recommended thicknesses for hard chrome plating:

(1) Plating from 0.00005 to 0.0001 in. thickness: carburetor parts, die casting dies.

(2) Plating from 0.0002 to 0.0005 in. thickness; metal drawing dies, files, drills, rocker cams, plastic molds, punches, other molds.

(3) Plating from 0.0006 to 0.0001 in, thickness: engraving rolls, printing rolls, metal blanking, drawing on non-ferrous metals, electroforming mandrels, drying rolls.

(4) Plating from 0.0011 to 0.005 in. thickness: pressure rolls, crankshafts, cylinders, parts to be used for reduction of friction wear, inspection tools, gauges, dies, etc.

(5) Plating over 0.005 in. thickness: hard wear and corrosion such as guides, journals, pumps, turbine shafts, etc. Build up, salvage, special application such as compressor rods, mining equipment, brick and tile mfg. parts, chemical equipment.

R. M. S. must be shown on all blue prints and orders.

Additional instructions necessary to get accurate quotes:

The following types can be used with all NAMF standards:

Type (1)—Material plated as received.

Type (2)—Material prepared before plating:
a) Polished
b) Ground, polished, polished and buffed to high luster

Type (3)—Same type as Type (2) before plating, *plus* (a) greaseless finish after plate, which will give an R. M. S. down to 6; (b) greaseless finish *plus* buffing to give R. M. S. down to 0.

Example:
1 Rubber Mold. Plate per NAMF (2), 0.0005 in. thickness, type (3), R. M. S. 2.

ZINC INSTITUTE ATTACKS MARKETING PROBLEMS

The zinc industry discussed marketing and research problems, and considered plans for action at the 40th Annual Meeting of the American Zinc Institute, Inc., April 14 and 15 at St. Louis' Chase-Park Plaza Hotels.

Major representatives of the zinc industry examined marketing problems arising from consumption-production trends, and discussed ways and means of maintaining and expanding present markets as well as developing new ones.

NACE REGIONAL AT NEW ORLEANS

The Annual Conference and Exhibition of South Central Region, National Association of Corrosion Engineers will be held at the Roosevelt Hotel, New Orleans, Oct. 20–24, 1958. A technical program is being arranged to include symposia on corrosion problems.

Meetings of several NACE technical committees, will be held Oct. 20–22 and symposia will be given on October 23 and 24. The exhibition will open Oct. 20 and close at noon Oct. 24.

STUTZ BALL ANODE CONTAINER

NEW CONSTRUCTION
For LONGER SERVICE . .
STUTZ CONSTRUCTION

Heavy gauge steel with wire woven through steel angle firmly attached to main stem. Cannot come apart or loosen. Side clip is for STUTZ BARREL PLATING TANKS having submerged rectangular anode bars. Side clip not furnished for racked plating tanks. Standard hook 6 inches. Other hook lengths furnished in quantity of 100 or more.

WELDED CONSTRUCTION — Note how welds have dissolved or broken in use. Often caused in barrel plating where currents are high and barrel transfer is rapid.

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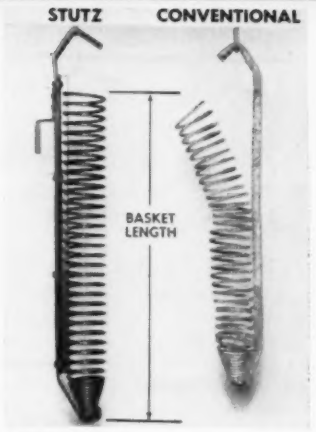

PRICES—11 cents per inch for basket lengths 18 inches or longer. Increments 3 inches. Curved containers one size only, 27" for 14" and 16" diameter barrels 15c per basket additional.

The STUTZ Company
Complete Metal Finishing Equipment & Supplies
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FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 542.

INDUSTRY NEWS

CARROLLTON PLANT DEDICATED BY M & T, CELEBRATING 50 YEARS

Sales potential of Metal & Thermit Corporation will be increased by one third when its new organometallic chemical manufacturing plant in Carrollton, Kentucky, is fully utilized, H. E. Martin, president, told guests at formal dedication ceremonies at the new facilities on April 2.

Governor Albert B. Chandler of Kentucky was one of the guests.

H. E. Martin
President

H. D. McLeese
Vice President, Sales

B. W. Weber
Vice President, Mfg.

C. K. Banks
Vice President, Research

The $3,500,000 installation, which is located on 150 acres of property, together with the recently dedicated ore processing plant in Hanover County, Virginia, are the first plants in the company's 50-year history to be constructed solely for purposes other than detinning.

With completion of the Carrollton facilities, Metal & Thermit will transfer its organic production unit from Rahway, New Jersey. It will provide capacity and flexibility to permit larger-scale output of new products which up to now have been manufactured in relatively small quantities in the New Jersey plant. Rahway will be rebuilt into an expanded pilot plant.

The Carrollton facilities themselves can readily be expanded threefold, Mr. Martin said.

Within the first year or two of operations, it is expected that Carrollton will produce 2,500,000 lb of chemical products with a market value of $4,500,000. In a few years, it is expected that production will rise to 7,000,000 lb with a value of $13,000,000.

Mr. Martin told guests that the Carrollton plant will be dealing with organometallic chemicals, the link between inorganic and the newer organic chemicals.

The Carrollton plant is believed to be the largest of its kind which is devoted entirely to commercial needs of all kinds in this new field, rather than to one specific market.

The first products to be made at Carrollton are a series of organotin compounds which are used in such end-products as vinyl plastics, rubber, biocidal and fungicidal agents, veterinarian medicines, etc. Eventually, other organic compounds of zinc, cadmium and phosphorous also will be produced.

This is a field of chemistry which is just opening up.

"Its future possibilities," Mr. Martin said, "are so limitless that even as this new plant swings into production, we can only surmise the products which will be shipped from here five years from now, to say nothing of the end uses to which they will be put."

50 Years of Growth

Metal & Thermit Corp. is this year celebrating its fiftieth anniversary.

The company was founded as the Goldschmidt Detinning Company in 1908 to utilize a European process for reclaiming tin and steel scrap from the tin plate scrap produced in the making of tin cans.

Within a year of its formation the new company had a detinning plant in operation at Carteret, N. J. And, at about the same time, to provide liquid chlorine needed in the detinning process, erected the first chlorine liquifying plant in this country.

Today the original Carteret detinning plant, enlarged and modernized, is still in operation. In addition, Metal & Thermit operates other detinning plants at East Chicago, Ind., and South San Francisco, Calif., while a subsidiary, Tin & Chemical Corp. maintains a fourth plant in Baltimore, Md.

Two basic products of its early detinning operations led to M&T's entry into the chemical field. These were tin tetrachloride, supplied to the silk industry for the weighting of silk, and tin oxide, furnished to manufacturers of ceramic ware to make ceramic glazes opaque. Starting with these two products a large number of inorganic and organic chemicals have since been developed for the ceramics industry and the electroplating field as well as for use in plastics, paper manufacture, textiles, pharmaceuticals, and in the manufacture of other chemicals. As a result M&T is now the world's largest producer of tin chemicals.

Chemicals are manufactured at the company's Carteret and East Chicago plants and at a new plant in Carrollton.

Other phases of M&T's business: metals production, mining, electroplating, arc welding products and organic coatings, stem from a company acquired just prior to World War I when M&T assumed its present name.

Research on a means of producing chromium metal electrolitically in the early 1920's resulted in a successful method of chromium plating which was the forerunner of the company's electroplating products and processes, now serving a wide area of the plating field.

An organic coating evolved for use in connection with one of the company's electroplating processes led to an extensive line of protective coatings. These include chemical and corrosion resistant materials such as plastisols, organosols, lacquers and enamels used both as product finishes and to protect industrial equipment from moisture, fumes, corrosive chemicals and erosion.

The company maintains executive offices in New York City and a modern general office building in Rahway, N. J. Research laboratories are located in Rahway and in Detroit, Mich., and sales offices are maintained in a dozen cities across the country.

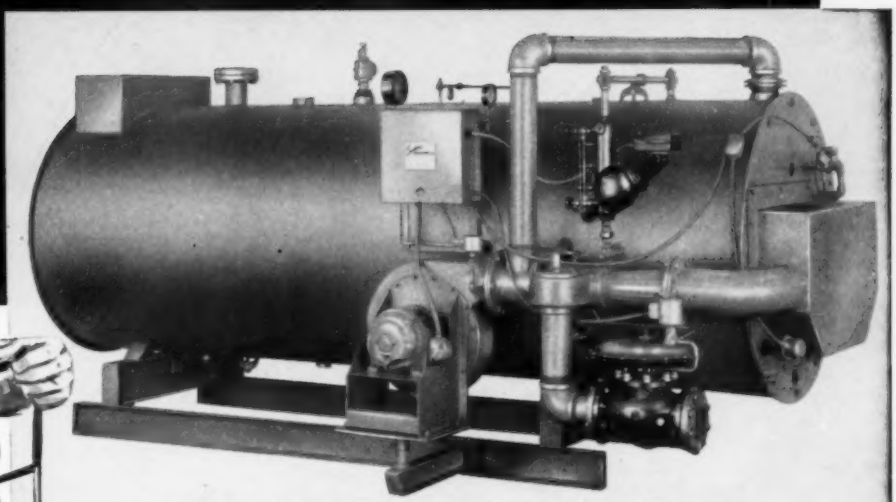
FORD LARGEST PLATING ORDER INSTALLED BY UDYLITE

Ford Motor Co. placed an order with The Udylite Corp. on March 16, 1956 calling for two Udylite bumper plating machines to be installed, one by Feb. 15, 1957 and the other by June 15, 1957. This is believed to be the largest order ever placed by anyone for plating equipment.

Immediately after the order was received, the team of Udylite personnel was formed to carry the planning, engineering, purchasing, building and installation.

By June 1, 1956 sufficient of the design

AT LAST A BOILER DESIGNED FOR THE PLATER!



Model 105 Sellers Closed Combustion Chamber Boiler

NOW—No more foul fumes because of incomplete combustion due to back draft through boiler created by exhaust fans or poor draft conditions.

SELLERS solves this problem with the improved design, closed combustion chamber boiler. All air for combustion, both primary and secondary, is pushed through the boiler under positive pressure, independent of partial vacuum in the building and independent of any back draft on the chimney (of course, products of combustion must be removed from building).

A positive pressure blower supplies air under pressure which is mixed with the gas and passed to burners in the completely closed combustion chamber; to complete combustion, secondary air is fed into the closed chamber under positive pressure (many times greater than the vacuum in the building). By this method of securing positive complete combustion, burned gases are pushed through the boiler and FOUL FUMES ARE ELIMINATED.

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5. POSITIVE PRESSURE BLOWER OVERCOMES BUILDING VACUUM AND CHIMNEY BACK DRAFT
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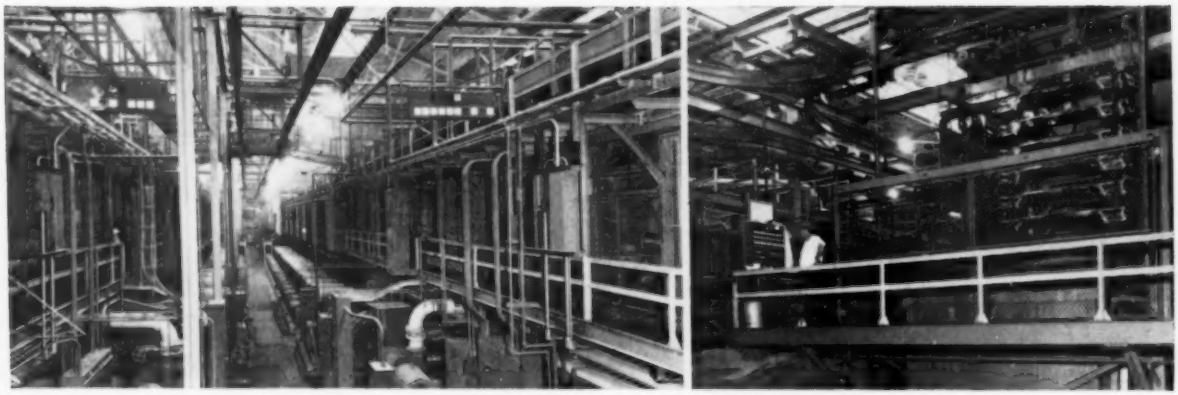

(Left) Center aisle of the plating section of the plater at Ford plant. (Right) Carrier and rack about to enter the plater, motor control panel is at left.

was completed that sewer and concrete work were started and progress was such that by July 1, the complete foundations were ready for the steel framework of both machines. Despite the steel shortage caused by the strike, the framework was started on Aug. 20 and the following week mechanisms started fitting in place.

During the time the various components were being manufactured and shipped, the foundations, mounting pads, drains, chemical resistant coatings, etc., were made ready to receive them.

On the 1st of July 1956 accessory equipment started appearing at the site and was set in place. Schedules were rigidly adhered to by all suppliers.

By July 10, all installation engineering had been completed and approved for all phases of construction. Construction contracts were placed. Plumbers started work Sept. 1, electricians in Oct. and sheet metal and ventilation workers in December.

On April 25, 1957 the first machine was ready for tryout plus indoctrination of Ford personnel.

The two machines were completed on June 20 and production was started on July 1 in a limited manner. Day by day production increased until full production was accomplished to meet the requirements for initial assembly of the 1958 models on schedule.

Giant machines of this type do not come in yearly models and the actual design is more of an evolution from smaller machines of the same type with improvements and additions.

The basic design of automatic selective cell plating was actually developed in a 60 ft model built by Udylite in 1951 and

FINE FINISHES REFLECT

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BUFFING COMPOUNDS

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SATIN *or Lustrous Finishing*

BAR, Liquid or Greaseless Compounds

E. E. Seeley Company, Inc.

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IT'S REVOLUTIONARY

IT'S WATERLESS

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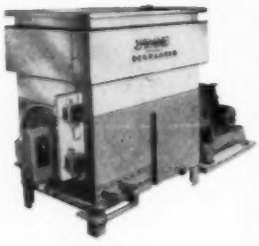

Controls vapor with refrigeration instead of water. Eliminates high water bills. Everything is automatic—one man can operate several units. Stops and starts are completely automatic.

JMJ maintenance is very low. Check these advantages and increase your profits.

We would like to tell you more about the new JMJ Waterless Vapor Degreaser. Write today.

R. W. LEGLER

Plating Works

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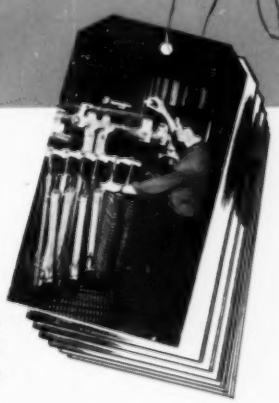
From H-VW-M

10 important ways to keep metal finishing costs down



All the processes, supplies and equipment in H-VW-M's line have been designed for maximum efficiency and cost savings. But among this full line are a group of products and processes which – if they apply to your operations – can offer outstanding costs and labor saving advantages. Included in this group are high-efficiency electrical and processing equipment, unusual processes, and finishing supplies having unique advantages.

The scope of the exceptional H-VW-M products, described on the following pages, covers a wide range of plating and finishing operations of every type, and the likelihood is strong that several, or perhaps all, are applicable to your plating plant. By investigating all of them, you should strike just the process, equipment or supplies you need to effect very real economies in your operations.

HANSON-VAN WINKLE-MUNNING CO. MATAWAN, NEW JERSEY U.S.A. SINCE 1820

HANSON-VAN WINKLE-MUNNING COMPANY

MATAWAN, NEW JERSEY

Manufacturers of a complete line of electroplating and polishing processes, equipment and supplies

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Sales Offices: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Chicago • Cleveland • Dayton Detroit • Grand Rapids • Los Angeles (Alert Supply Co.) • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield (N. J.) • Rochester • St. Louis • San Francisco (Alert Supply Co.) • Stratford • Toledo • Utica • Wallingford (Conn.) • West Springfield (Mass.)

10 important ways to keep

New Germanium Rectifier with panel removed to show simplified construction.

Manual Tap Switch Control

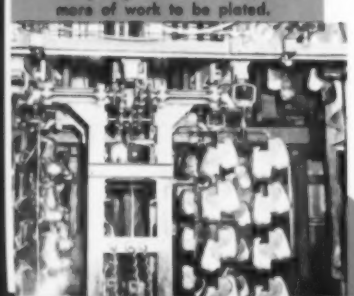
Motor Operated Tap Switch Control

Continuously Variable Auto-Transformer

Saturable Core Reactor

Operator is shown adjusting the Dial-A-Cycle mechanism that will determine the cycle for this rack of work.

Automatic loader-unloader has just removed two racks of plated bumper guards and loaded two more of work to be plated.



ELECTRICAL AND PROCESSING EQUIPMENT

GERMANIUM RECTIFIERS

H-VW-M Germanium Rectifiers, known for efficiency, operating economy, compactness and close voltage control, are available in 6 to 150 volt capacity, with current outputs from 500 to 10,000 amperes. Designed for 24-hour-a-day operation at full capacity, with outputs of 12 volts or more, they have efficiencies up to 92%. Exceptional efficiencies are attained at ¼ and ½ loads. Voltage regulation as low as 5% can be obtained from no load to full load on some models at voltage ratings of 20 volts and above. Available with various types of voltage controls, manual or automatic, in self-contained or remote-controlled models.

Also look into the revolutionary new low cost line of Powertron Germanium Rectifiers—an H-VW-M first—with exclusive new features. These include: no-fuse DC protection system, no paralleling of junctions, high efficiency and improved regulation of germanium, 44 control positions with range of 2 to 12 volts, and less than 5% ripple. Available in ratings of 750 amperes, 1500 amperes, and 3000 amperes. Something special in packaged units and you get all the advantages at a new low price. If one of these fits your plating requirements, then you've got a real bargain. Immediate delivery. Write for catalog.

RECTIFIER CONTROLS

H-VW-M offers a complete line of rectifier controls to provide for many control functions. Used with either selenium or germanium rectifiers, these controls, properly applied, permit the most efficient control possible. Such devices as manual and motor operated tap switch controls, continuously variable auto-transformers and saturable core reactors are used with or without supplemental controls to provide automatic voltage stabilization, automatic current stabilization as well as automatic programming. H-VW-M Bulletins ER-108 and ER-109 further explain economical H-VW-M Rectifiers and Controls. Write for it.

FULL AUTOMATIC CONVEYORS

For well over 30 years H-VW-M design engineers have worked continuously for improvements in the automatic conveyors for electroplating and allied operations in which H-VW-M pioneered.

Today's full-automatic conveyors are a far cry from the conveyors produced by H-VW-M as early as 1922. But one thing remains the same – and that is H-VW-M's desire to provide the most advanced and efficient equipment possible. Scores of innovations and improvements resulting from continuing H-VW-M research mean today's H-VW-M Full Automatic Conveyors offer the ultimate in service and efficiency for peak production of the highest quality at lowest cost.

DIAL-A-CYCLE CONTROL

Exemplifying the many H-VW-M developments contributing better, easier plating, is the remarkable new DIAL-A-CYCLE Control. This unique selective by-pass mechanism – of particular interest to aluminum anodizers – permits a whole series of different operations and cycles in one full automatic conveyor. Length of any treatment time can be varied, and, in anodizing, different colors can be anodized in one continuous operation, and in any sequence. It is a truly revolutionary device, resulting in remarkable labor savings and increased production.

AUTOMATIC LOAD-UNLOAD

Automatic Load and Unload is another recent development of H-VW-M that contributes to greater economies in the plating room. This new transfer unit, operating the same indexing sequence between plating conveyor and a monorail conveyor loads and unloads racks automatically. Manual handling is eliminated by this major advance towards automation in metal finishing.

This, of course, is just one of many types of conveying equipment offered to metal finishers. Return type conveyors, elevator conveyors, high-lift conveyors, straight line conveyors, and others – of every description are H-VW-M designed, manufactured and installed. If you'd like to know more about the cost-saving story of H-VW-M Full Automatic Conveyors, write for Bulletin FA-105.

metal finishing costs down

BUFFING AND CLEANING SUPPLIES

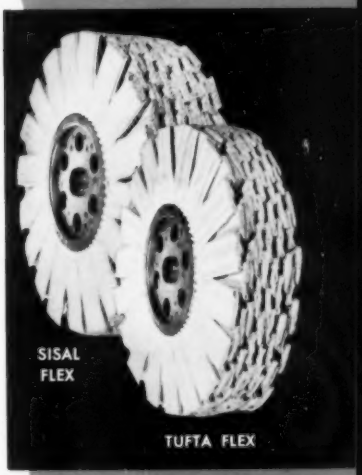
BUFFS

Tufta-Flex and Sisal-Flex Buffs

Speed and economy are embodied in two new H-VW-M Buffs for thorough cutting and coloring on contoured surfaces. For medium and heavy duty, SISAL-FLEX Buffs with sisal-cored tufts are available, and for light to medium duty, TUFTA-FLEX Buffs, having full cloth tufts, are offered.

Both buffs feature double-folded tufts for maximum cutting surface, and to retain compound on the leading edges and ends of the tufts. To prevent streaking, tufts are staggered in a double row around the buff. Cool running, a feature of both buffs, is the result of staggered tufts, plus a pattern of ventilating holes in the rugged steel center. Fraying, which is wasteful and expensive, is ruled out by the bias-cut construction of both cloth and sisal.

These time and cost-saving new buffs are available in standard diameters from 12 to 18 inches.



Plain Ruff-L-Buff (below) after wearing off 1 inch in test. Loose threads, numerous holes and breaks due to excessive heat and abrasion are apparent.

BINDERIZED® RUFF-L-BUFFS

"BINDERIZED" Ruff-L-Buffs are pre-treated with a high quality compound binder. Because every fibre is impregnated with the same binder used in buffing compounds, Binderized Ruff-L-Buffs are ready for operation at top efficiency from the very first piece.

The cost-saving advantages of Binderized Ruff-L-Buffs are many. "Heading-up" is eliminated, thus break-in time is radically reduced. Because of the natural affinity between the Binderized Ruff-L-Buffs and the compound, the compound lasts far longer, and is easier to apply. Naturally, much better cut is obtained because of the high amount of compound carried.

Perhaps the greatest advantage of Binderized Ruff-L-Buffs is their internal lubrication which prevents wear inside the buff (see photos). Wear is even—and up to 30% longer. To learn more about the unusual economies of Binderized Ruff-L-Buffs, write for Bulletin No. B-103.

Binderized Ruff-L-Buff (below) after same test. Notice absence of thread or cloth breakage, convincing proof of Binderizing's effect on buff life.

LIQUIMATIC COMPOUNDS

and application equipment

Buffs "live" up to 200% longer . . . No compound waste . . . Reduced labor costs . . . Fast cutting, easy cleaning—all these advantages and more are embodied in the unusual Liquimatic Liquid Compounds and application equipment.

Because of the enormous economies of using the Liquimatic System, the system soon pays for itself in buff, compound and labor savings.

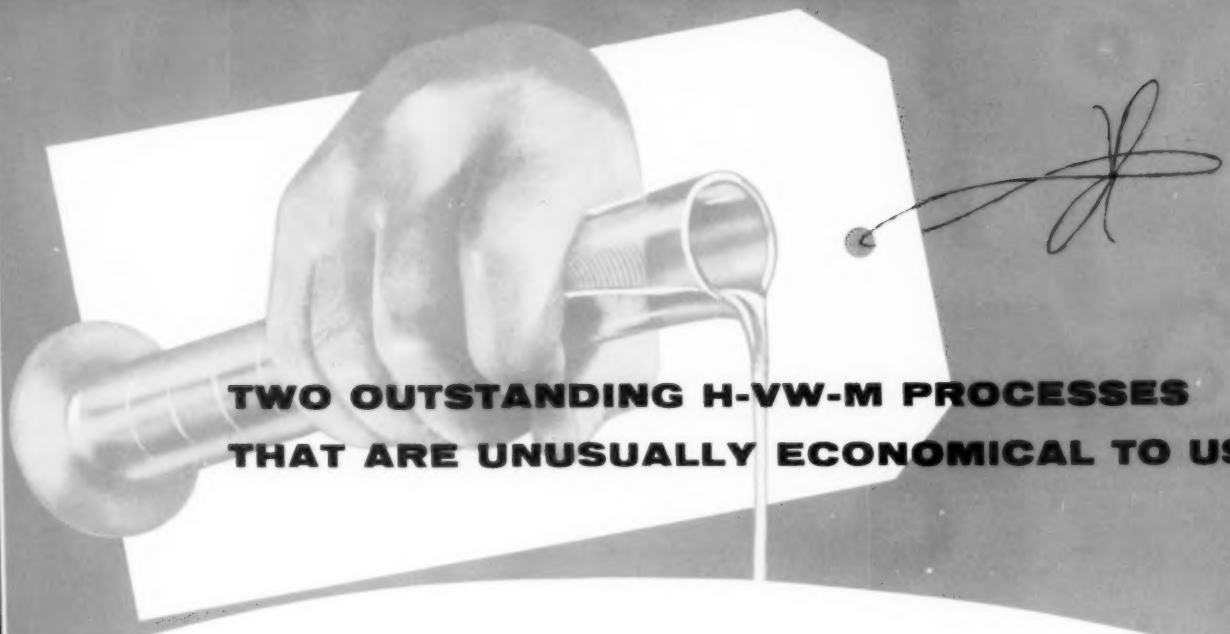
A complete line of Liquimatic Compounds is available for cutting and coloring ferrous and non-ferrous metals. These provide an adhesive, slow-wearing buff face, and have a high safety factor because of their high flash point. All are of sprayable viscosity, and have a long storage life. Write for H-VW-M Bulletin No. Co-103, which fully describes Liquimatic and other economical H-VW-M Compounds.

85-S ALUMINUM CLEANER

H-VW-M devotes constant research to the subject of cleaners and the result is a comprehensive line of Matawan Cleaners giving superior results in soak cleaning, power spray operations, oxide removal, and special cleaning and etching operations.

Of particular importance is H-VW-M's new 85-S Aluminum Cleaner, which offers interesting advantages to aluminum finishers. It prevents scale formation, for instance, thus keeping coil and tank walls scale free, and it leaves an extremely bright surface. Its built-in regenerator makes maximum effective use of caustic in the bath.

H-VW-M Bulletin C-108 tells about this unusual cleaner, and other Matawan Cleaners offering unusual money-saving advantages.



TWO OUTSTANDING H-VW-M PROCESSES THAT ARE UNUSUALLY ECONOMICAL TO USE

LEVELUME

H-VW-M's new LEVELUME represents a milestone in nickel plating processes. It is the first bright nickel process to combine qualities of full brightness, high leveling and exceptional speed. In high-production installations, deposition rates with LEVELUME are 100% higher than those obtained with any other process, but will require some air agitation equipment.

Conversion to Levelume is simple, involving no new investment in conveyors, or tanks.

Key to the new process are its addition agents. With them an activated carbon pack can be used in the plating solution filter. This constantly removes harmful organic contaminants, preserving the purity of the bath, and consequently contributing to the economy of the process.

A few of the additional benefits include high surface activity, good ductility, controlled stress, and the feasibility of double coatings. A full description of the process–one in the family of NICKELUME processes – is available in the Levelume Manual, which is available on request.

CADALUME

H-VW-M's New Cadalume Process has all of the extras that you have been looking for in cadmium plating. It is the newest and best answer because it does the job faster and better. The new improved Cadalume Process of H-VW-M *lets you get at least 80,000 ampere hours for every gallon of brightener consumed. And bright dipping is eliminated for most applications!* The secret? It's simply this: You use two different Cadalume Brighteners. One is the Cadalume Make-Up Brightener and you use it only when you make up a new bath or convert an existing one. The other —Cadalume Brightener—is the strong addition agent used for all maintenance.

Here's why Cadalume keeps your costs low: The bright range is increased up to 10% . . . you get very high plating speeds—up to 10% increase . . . 4 times longer bath life . . . better distribution . . . and the brightener is more stable—it won't plate out. This simple, easy-to-operate economy is something for you to see. Ask for the New Cadalume Technical Manual.

H-VW-M PROCESSES, SUPPLIES AND EQUIPMENT KEEP PLATING ROOM COSTS DOWN . . .
They're Always Your Best Buy!

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DEMAND, internationally, for copies of the recently published 1957 Edition of the AES's book, TECHNICAL PROCEEDINGS, is gaining momentum. Hence, the Society's limited remaining supply is fast diminishing.

Containing each of the technical papers delivered before the AES's 44th Annual Convention held in Montreal, Canada, June 17-20, 1957, together with their charts, diagrams, graphs, tables and other illustrations, and with the verbatim discussion that followed their delivery, TECHNICAL PROCEEDINGS broadly enriches technical and scientific knowledge in the field of electroplating, metal finishing and allied arts.

Orders for copies will be accepted and serviced by the American Electroplaters' Society on strictly a first come, first served basis so long as its limited supply lasts.

The domestic cost of the book is $10 per copy including postage. To those ordering it from outside the United States' continental limits, the charge is $12 per copy including postage cost. All orders must be accompanied by payment in full so as to obviate unnecessary bookkeeping expense. Address orders to:

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since that time a number of machines employing this principle have been built. U.S. Patent No. 2,789,569, assigned to The Udylite Corp., discloses the mechanical and electrical principles used.

The two platers each are 709 ft long. They are 25 ft high and 23 ft wide or as tall and wide as an average 5 room home.

The platers filter 296,000 gal of plating solution an hour. To supply the facilities, the 365 pumps are capable of delivering 3,037,800 gal/hr or more than the City of Monroe supplies through its water system in an entire day.

The platers use 2700 gal of water per min and exhaust over ¾ million cu ft of air per min in order to keep fumes from becoming distressful to the employes.

It requires nearly 2500 BHP capacity in steam to control plating solution temperatures. The refrigeration capacity for control of lower temperature solutions is 900 tons. The 81 generators will deliver over ¾ million amp at low voltages from 4 to 18 with a large variety of special automatic control features.

The monorail system feeding and unloading these machines is completely automatic. It runs at heights of from 9 to 32 ft from the floor with elevators to accomplish the change in heights necessary to bring the racks of bumpers in out of the platers. In all, more than ¾ mile of track is installed around these enormous platers.

Over one hundred thousand feet of bus bar was used to connect DC power to the machine. Over 4 miles of various steel and special pipe and more than 30 miles of various sized wire for AC connection of controls.

DIVERSEY EXPANDS WORLD-WIDE

The Diversey Corp. of Chicago, worldwide manufacturer of chemical products, has extended its operations in Canada and the West Indies with the opening of a new, $750,000 plant in Clarkson, Ontario. The new structure is the largest in the Diversey chain outside the United States, and represents the third major addition to the company's international expansion in the past four months.

The building will be the new headquarters of The Diversey Corp. of Canada, Ltd., which has shown a steady growth in its twenty years from an original $20,000 investment to current total assets of more than $1,500,000.

The company has seven plants in the United States and a chain of offices and plants throughout Canada, Australia, France, England, Brazil, Hawaii, Puerto Rico and Venezuela.

Most recent additions to The Diversey Corp. in its accelerated expansion program prior to the new Canadian acquisition, were chemical plants in Honolulu, and Waco, Texas.

The Clarkson property is located on a 22-acre site, covering 44,000 sq ft of manufacturing, warehousing and laboratory areas, and over 14,000 ft of general office space. It is a two-story structure of brick and glass, with year-round air conditioning.

WAGNER BROS. APPOINTS COWLES CHEMICAL

Wagner Brothers Inc., Detroit, supplier of plating processes, salts, anodes and equipment, has been appointed a distributor for the complete line of metal finishing chemicals produced by Cowles Chemical Co., Cleveland.

According to C. C. Clabaugh, manager of Cowles metal finishing chemicals department, Wagner will carry stocks of the products at its various regional warehouse points. Cowles sales and technical service personnel, Clabaugh says, also will work closely with Wagner's local representatives.

The metal finishing chemicals will continue to be sold by present Cowles distributors, as well as direct from the company's warehouse stock points.

SUN CHEMICAL IN NEW QUARTERS

Sun Chemical Corporation "is at home" in a new office at 750 Third Avenue, New York City. For the past nine years the corporation has occupied its own building in Long Island City.

All the administrative and executive offices of the corporation will be centralized within 42,000 sq ft of floor space in the new 34-story building.

The move to a more central location was decided upon in order to expedite internal communications as well as for the convenience of Sun Chemical customers.

Once you use it you'll Order... Again... and Again... and Again!

Every can filled with a full weight of extra high quality 99.75+% Chromic Acid. Prompt delivery made from ample factory and nearby distributor stocks.

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Presentation of Hull Award. Left to right, R. O. Hull Jr., vice president, R. O. Hull & Co.; Tom Davy, president, Ardco, Inc.; Bob Runzell, winner of the award, Ardco; Curtis Miller, sales manager, R. O. Hull; Edward Wild, technical representative, and V. C. Anderson, vice president, Ardco.

R. O. HULL AWARDS BERMUDA TRIP TO SALES WINNER

In the "Everyone Wins-Bermuda Plan for 1957" contest conducted by R. O. Hull & Co. Inc. on increased yearly sales of Rohco products by its representatives, Bob Runzel of Ardco, Inc. at Chicago won the first grand prize of a vacation trip to Bermuda for two. The award was officially presented at a group luncheon in the Clearing Industrial Club.

Second grand prize was won by Gene Holzem of the W. D. Forbes Co. in Minneapolis. Third grand prize went to Earl Stadel of the George L. Nankervis Co. in Detroit. These were cash awards for a job exceedingly well done, since all three grand prize winners were very close together right to the finish.

Because 84 per cent of the contest participants received one or more monthly cash bonuses during the year for increasing their quota over the previous year, this type of contest was a big success and commensurate enough to its title for popular demand to continue it again in 1958.

ELECTROFORMS HAS NEW PLANT

Electroforms, Inc., producers of electroformed aircraft, missile, industrial and environmental test parts, will soon move into their new facility, now nearing completion. Located at 239 East 165th Street, Gardena, California, this new 20,000 sq ft plant will enable Electroforms to meet the increasing demand for their products and services.

Techniques developed by Electroforms have contributed substantially to the simplification and adaptability of aircraft ducting, missile plumbing, aircraft fuel line sections, missile nose cones, wind tunnel nozzles, jet engine parts and many other complicated configurations, as well as such industrial items as plastic fiber-glass lay-up molds, plastic dip and slush molds, and injection molding dies.

At the present time, Electroforms is able to produce parts as large as nine feet in diameter by eight feet high. At their new facility, they will be able to electroform parts substantially larger than this.

ALLIED CHEMICAL CHANGES NAME

One of America's large diversified chemical companies doing business since 1920 as Allied Chemical & Dye Corp. is about to become simply Allied Chemical Corp.

Allied's six operating Divisions have about 30,000 employes who produce some 3000 products at more than 120 plants, laboratories, mines and quarries. Products are marketed through the company's International Division in foreign countries.

In addition to being a manufacturer of basic chemicals for virtually every industry, Allied through research has developed such new products as aerosol propellants and refrigerants, polyethylene, isocyanates for flexible and rigid urethane foams, caprolactam for use in the company's own nylon fiber, Caprolan, and in its Plaskon nylon molding resins, and also for sale to manufacturers of synthetic fibers and molders of nylon parts.

On the research side, Allied operates 12 laboratories which employ more than 1600 chemists and technicians. At present, an estimated two-thirds of the research budget goes into the development of new products and processes. The remaining one-third is used for improving properties of existing products and for fundamental and application research.

Research expenditures at Allied have grown from $8 million a decade ago to $17.5 million. In the same period, the company's sales have risen from $387 million to $683 million.

FRED A. ASTON SR.

Fred A. Aston Sr., retired sales manager for national accounts for Oakite Products, Inc., died on Thursday, March 6, at his home in Lauderdale-by-the-Sea, Florida. He would have been 80 years old on April 28.

Mr. Aston, a native of London, England, joined Oakite in 1913 when the company was four years old. He served for many years as the company's representative in Detroit, and, when appointed sales manager for national accounts, in 1940, kept his headquarters there. He retired to Florida in December, 1955.

Mr. Aston is survived by his wife, Ada, and a son, Fred, Jr., sales manager of Oakite's package division.

Funeral services were held on Saturday, March 8, in Fort Lauderdale.

BUFFS FOR INSIDE POLISHING

GOBLET BUFFS, TAPER BUFFS, CYLINDER BUFFS, SMALL POLISHING WHEELS, RAZOR EDGE BUFFS, and many others for deburring, polishing and grinding any internal contour.

Write for additional information or contact your local dealer. These buffs are stocked by many dealers throughout the country.

We manufacture a COMPLETE LINE OF BUFFS including full disc loose and sewed buffs and polishing wheels. Our metal center BIAS TYPE BUFF may help cut your polishing costs.

Your request on your letterhead will bring our complete catalog by return mail.

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INDUSTRY NEWS BRIEFS

GOVERNMENT REPORT ON NICKEL FOR YEAR 1957

The availability of nickel since mid-1957 exceeded demand for the first time after many years of shortages, states the report of the Bureau of Mines, United States Department of the Interior released at press time. The improved supply-demand position resulted mainly from increased production, virtually complete stockpile deferments, and decreased requirements for nickel in the United States. Despite the improved supply, intense activity continued in exploring for new sources, developing new mines, and planning new and expanding present smelting and refining facilities.

Free-World production of nickel advanced for the seventh consecutive year to establish a new high of about 248,000 short tons in 1957, a 7-per cent increase over 1956. Of the 1957 output, Canada furnished about 76 per cent, producing 5 per cent more than in 1956. Output in Cuba was 38 per cent greater than in 1956. Canada and Cuba made new production records. Domestic production (about 10,000 tons) also made a new record, increasing about 50 per cent, but it was equal to only 8 per cent of consumption in the United States in 1957, compared with 5.3 per cent in 1956.

Stocks of nickel held by consumers in the United States at the end of 1957 were the highest ever recorded and totaled about 25,000 short tons, compared with 12,672 tons at the beginning of the year.

Consumption and imports of nickel in December were 12 and 13 per cent, respectively, less than in November, according to the Bureau of Mines.

TIN RESEARCH ANNUAL REPORTS ON NEW PLATING BATH

The annual report just released of last year's work of the Tin Research Institute indicates that all departments were actively engaged in pursuing new ideas and developing fresh applications of tin.

An achievement was the publication of a method of producing electroplated deposits of tin in a fully bright form. The tin deposit obtainable by electroplating has hitherto been matte and chalky in appearance and the new method produces coatings which come from the bath with the appearance of having been mechanically polished. The composition of the bath and the conditions for operating it have been published and the process is available without patent restrictions of any kind. Other plating developments reported include the adoption of tin-nickel alloy electroplate by instrument makers when hard-wearing and corrosion-resistant finishes are required.

Corrosion studies at the Institute lately have been concerned with the nature and structure of oxide films on tin and tinplate; both natural and artificially produced films are being investigated. The adhesion of lacquers to tinplate is also being studied.

AIRCRAFT METALS WILL BE SUBJECTED 4000° TEMPERATURE IN FUTURE

Operating temperatures for aircraft and missile materials in the next 10-year period should reach 2500F for a few minutes and 4000F (some steels melt at 2500F) for a few seconds, according to a survey made by the Aircraft Research and Testing Committee and Manufacturing Committee of the Aircraft Industries Association.

During the next five years, it was estimated, top operating temperatures will be 1200F for prolonged periods and 2000F for a few minutes.

Barrel Nickel Plating

●

Quality and economy are essential today. This is the time when the ability to provide service and quality is essential to keep customers. It is no time to use alibis. The trouble must be eliminated or quickly corrected.

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Today is no time to try those unproved materials unless you have much to gain. True Brite Nickel Brightener remains the standard of barrel nickel brighteners. It has been proven trouble free, simple to operate and capable to adaption to your needs. We do not suddenly find solutions which need drastic treatments and special addition agents.

●

Troubles are simple and easily corrected. One problem often encountered is lack of adhesion to hardened parts. Epsom salts appear to help this condition which tend to produce more ductile plate. Metallic impurities are removed by dummy plating at about 1 volt on suitable dummys.

●

True Brite Nickel has proven economical to operate and gives you more active material per gallon than any other material we have checked. We were the first to use 4 gallon non returnable cartons. All told we could try to convince you but the best proof is to use it. We will be glad to send you our bulletin with suggested formulas and methods of use. Why put up with trouble and poor work any longer when True Brite Nickel Brightener has the answers for you.

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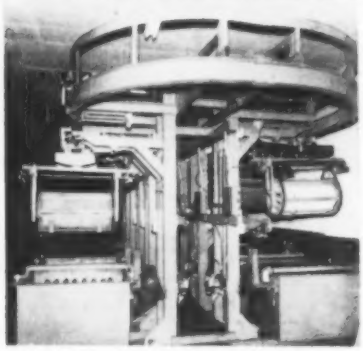

E—501. Automatic Processing—The new Abbey-Matic, a development of Abbey Process Automation, Inc., is said to be the first system of its kind to perform automatically each and every decision and movement of skilled operators with monorail hoists—eliminating both. It is further claimed to eliminate need for auxiliary conveyors with synchronized load and unload devices. Designed for high-production processing and job-type multiple operations, it completes all cycles with uninterrupted continuity from loading to unloading, accurately and automatically over its overhead trackway, by remote control. The system adapts to any premises and floor plan, utilizes existing tank line equipment, integrates with power and free conveying system for rapid transfer. It is said to provide for carrier accumulation, periodic feeding and loading; then after processing, conveys to any location for unloading, reloading, and return to processing.

In high-production set-ups, full-cycle processing is up to 20 per cent faster, due to continuous, undelayed carrier "flow". Job-type, tank line operations are claimed to be much faster, and eliminate all man-hours and hoists. Resulting economies are estimated up to 60 per cent of former costs.

Abbey-Matic is steel fabricated in interchangeable sections by single-station units. Sections are self-leveling for rough floors and not anchored so that systems can be extended or reduced simply by adding or removing stations as desired.

To be released shortly is a new medium-duty rack machine incorporating similar principles of automatic operation.

E—502. Trichlorethylene Additive—A new additive for trichlorethylene is said to increase the penetrating and dissolution power of the solvent for solid dirts and buffing compounds. The additive, designated Compound U-22 by Stratford Chemical Co., Inc., may be added directly to the soak tank of a vapor degreaser to increase its power to dissolve and emulsify buffing compounds. Since the additive will not distill over in a vapor degreaser, the final flush-off sometimes employed will be of pure solvent. Once added, it need never be replaced until the degreaser sludge is removed.

When added to the solvent and used cold a no-flash-point emulsion cleaner is formed that removes buffing compound quickly and is water emulsifiable.

E—503. Ultrasonic Equipment—The General Ultrasonics Co. has introduced a new line of ultrasonic processing equipment utilizing a patented transducer element.

This new transducer element is constructed mainly of solid metal sections and is joined to stainless steel radiating surfaces by welded studs. The equipment is powered by relatively small generators, producing high intensity ultrasonic energy at low cost, it is reported.

These transducers are built into self-contained stainless steel Sonitanks ranging in size from 6 quarts to 50 gallons. For larger installations, the transducers are built into all-welded, hermetically sealed, immersion Sonicells for use in existing tanks.

This equipment is used for cleaning and degreasing of jet engine and missile parts, ball bearings, optical goods, molds, semiconductors, electronic tube parts, etc.

E—504. Monitoring System—A new monitoring system to check and indicate malfunction in the operation of its automatic demineralizing plants has been developed by the Graver Water Conditioning Co.

Called the Graver Monitor, the system provides an "electrical shadow" which follows the cycle control sequences and

the operation of the automatic valves and auxiliaries. If a valve operation or sequence is not in the proper order or a component of the automatic system is not functioning properly, the monitor receives impulses from a feedback and indicates and locates the problem. The unit can be arranged to sound an alarm, shut down the plant or both.

The monitor panel has three basic groups of lights. One group shows if the demineralizing units are in service, regeneration, backwash or rinse. Another indicates which step in the process is taking place. The third has a series of three lights for each valve, pump or other auxiliary.

E—505. Acid Inhibitor—Aceto Chemical Co. is now manufacturing Pickel-Aid, an active powdered inhibitor which is completely water soluble. When added in small quantities to pickling baths, this agent is said to inhibit attack by the acid on metallic surfaces, without retarding the removal of oxide scale or rust incrustation. It can be formulated with dry acids, such as sulfamic, bisulfate, etc.

E—506. Scrubbing Tower—Gas scrubbing towers said to be capable of resisting highly corrosive gases and extreme temperatures are now being fabricated completely from Duracor reinforced plastic by The Ceilcote Co. for the chemical and metalworking industries.

Duracor is claimed to be corrosion-resistant throughout, and is used in the scrubber base, body and tower for long life and maintenance-free operation.

Important physical properties of Duracor include tensile strength ranging from 11,000 to 15,000 psi and flexural strength from 20,000 to 30,000 psi.

GRAVER SYSTEMS *SIMPLIFY* TREATMENT OF COMPLICATED PLATING WASTES at MARTIN-ORLANDO

Building missiles is a complex job. Thousands of intricate parts must be machined to close tolerances and plated or coated with a wide variety of materials to resist corrosion and guarantee dependable performance during flight. Many are chrome plated, silver plated, anodized, phosphatized, pickled, passivated or processed in other ways. An unusually large number of acid and chemical wastes results, including nitric acid, hydrofluoric acid, sulfuric acid, caustic and cyanide. Handling these wastes is a complex problem in itself.

Martin-Orlando of Florida, builders of guided missiles, selected Graver to supply all units and auxiliary equipment for a treatment plant based on plans and specifications prepared by the Architect-Engineers. Graver, working with the consulting engineers, fabricated and installed a plant which handles this treatment problem simply and directly. Four integrated systems effectively treat all wastes in the spent baths and rinse. The plant is safe, efficient and simple to operate and maintain.

This installation is only one of the many modern plating waste treatment systems Graver has furnished for large and small manufacturers in every field. Graver supplies all types of equipment, from simple units to entire plants and makes available a complete service, including research and development, manufacturing and installation, when required. Whatever *your* waste treatment requirements, Graver has the modern designs, equipment and processes to do the job efficiently . . . economically. Every installation is tailored to specific needs.

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Craig L. McAlister

Meet Mr. President

Craig L. McAlister, 1957–1958 president of St. Louis Branch of the AES, received training in metallurgy, chemical and electrical engineering at Washington University evening school.

He started work in the electrical laboratory of Bussmann Manufacturing Company, then a division of McGraw Electric, in January, 1942.

In 1946, installations of barrel zinc and albaloy electroplating baths were made, at which time a chemical laboratory was established with Mr. McAlister at its head. It was at this time that he joined the St. Louis Branch. For the past six years he has been a delegate or alternate to the AES Supreme Society.

In the latter part of 1956 the McGraw Electric Company merged with the Thomas A. Edison Company, forming the McGraw-Edison Company. At the same time expansion measures were in progress and on February 11, 1957, Edison's birthday, the 2500 square foot Thomas A. Edison Laboratory of Bussmann Manufacturing Division of McGraw-Edison was dedicated, with Mr. McAlister in charge.

The new production control, research and development laboratory has metallurgical analytical, environmental and physical testing equipment including X-ray, high vacuum and a complete electroplating lab.

Craig McAlister has played an important role in the development of many new electrical protective devices and has several patents to his credit.

E—507. Buffing Composition—The Buffing Composition Laboratory of Frederic B. Stevens, Inc. has developed a new all purpose liquid tripoli buffing compound said to have vastly improved cutting and cleaning abilities.

This new liquid composition known as Stevens 58-L liquid tripoli can be used on all non-ferrous metals including die castings, copper plate, brass and aluminum.

It was originally developed for use in the automotive industry.

E—508. Steel Abrasive—A new steel blast cleaning abrasive has been introduced by the Pangborn Corp. With a narrow hardness range, extreme uniformity, density and toughness, the Rotoblast Steel Shot will provide improved cleaning quality, faster cleaning speeds and lower production costs in foundry, forge, descaling, maintenance and finishing operations, according to the company.

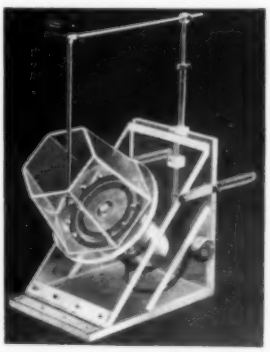
Available in all standard SAE sizes, the abrasive is made of electric furnace alloy steel and is shotted by a vacuum cast method which is claimed to provide great density and eliminate voids and defects.

E—509. Belt Grinder—A new conveyor-type abrasive belt machine manufactured by Engelberg Huller Co. makes possible six grinding operations in a single conveyorized pass. Designed for high-volume flat surfacing of ferrous and non-ferrous metals, glass, plastics, ceramics and other materials, the model No. 680-6 is equipped with six individually-adjustable grinding heads. By using a series of progressively finer grit abrasive belts, unmachined parts can be rough-ground, precision-sized, and machined to a fine, micro-inch finish in one continuous operation. For parts requiring rapid but exceptionally heavy stock removal, identical belts can be used on each grinding head to multiply production rates.

E—510. Addition Agent—A new addition agent for copper plating which is designed to act as a grain refiner in producing dense copper deposits is announced by Wagner Brothers Inc.

An alkaline material, soluble in a cyanide solution, the agent is said to provide soft, ductile deposits which can be used as a stop-off for selective hardening in heat treating operations, or as a smooth buffable copper. It can be used in both barrel and rack-type operations.

A yellow liquid, the development, referred to as CU-521, is reported to have good throwing power, and can be plated at current densities up to 50 amp/sq ft without roughness or burning. When operated at 100 per cent efficiency and increased copper metal content, it is said to be capable of producing bright out-of-the-bath copper deposits with current densities up to 25 amp/sq ft.



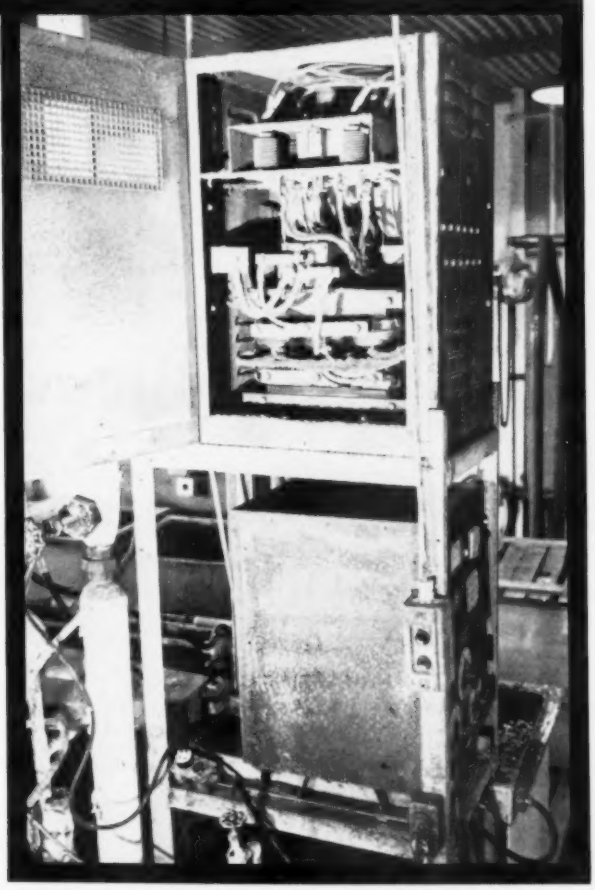
E—511. Triple Unit—A new laboratory unit from Belke Manufacturing Co. features a hinge-mounted drive that tilts back for plating with the cylinder in oblique position. It adjusts for burnishing with the cylinder in the horizontal position. Plating and burnishing cylinders set on the drive shaft without fastening.

The plexiglas plating cylinders hold most any plating solution. They are smooth inside and successfully plate even the smallest pointed objects, it is reported.

E—512. Protective Coating—Allied Research Products, Inc. has announced the introduction of Irilac No. 1000, a new type of clear, protective coating for steel and non-ferrous metals. The product contains corrosion inhibitors and can be used to replace or enhance other chemical and electrolytic finishing systems. It uses water as a solvent and is applied to the surface by dip, brush or spray method. It dries to an extremely thin, tough, durable coating which brings full tone to colored surfaces and clarity to iridescent surfaces, according to the company.

Richardson-Allen plus SILICON makes the difference

Now, check the results of the longest actual field test ever conducted in the electro-plating field...



Richardson-Allen pioneered in putting SILICON to work in electro deposition rectifiers. Extensive field tests have proved beyond any doubt that Richardson-Allen electro-plating rectifiers with SILICON are first in performance and dependability.

Check the amazing results on this Richardson-Allen installation...

TIME WORKED—
over two years, aeraging 16 hours a day, six days a week... and still functioning perfectly with...

NO FAILURES DUE TO CELL—
hermetically-sealed SILICON cells do not age, and never wear out.

For complete performance dependability, unequalled life and trouble-free hours of constant work, consult Richardson-Allen for SILICON rectifiers specifically designed for electro deposition. Information on selenium and germanium installations also on request.

Picture courtesy of: Semi-conductor Division, Westinghouse Electric Corp., Youngwood, Pa.

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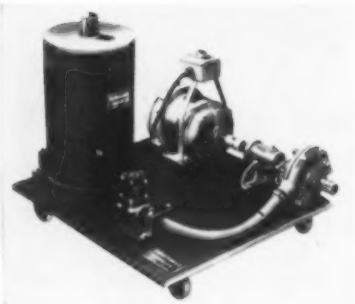


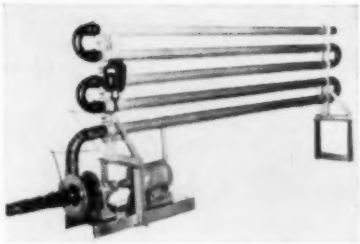
E—513. Filter Pumps—Sethco Mfg. Co. reports a new series of rubber lined filter pumps for filtering corrosive alkaline and acid solutions, including solutions high in sulfuric and chloride content. The filter is said to remove particles down to one micron.

The ARLI series consist of a centrifugal pump coupled by means of a flexible coupling to a totally enclosed motor. The filter chamber is connected to the outlet of the pump by chemical hose. A diaphragm valve located between pump and filter chamber is used for flow regulation. All component parts are mounted on a plastic panel which in turn is mounted on casters for portability. Twenty-five feet of chemical hose is furnished. Inlet hose is equipped with plastic strainer. Four models are available with this series.

Cotton and dynel tubes are available with either a stainless steel or perforated bakelite supporting core.

E—514. Ultrasonic Cleaner—A recent addition to the line of ultrasonic cleaning equipment offered by Acoustica Associates Inc., is the 150 gallon capacity DR-2000AH system. It features a cleaning tank measuring 3 ft sq by 2.5 ft which is fitted with an array of twenty bottom-mounted transducers. These are driven by a simplified pulsed electronic generator delivering 8,000 peak power. Either solvent or water detergent-solutions can be used

The new equipment features all-welded stainless steel enclosed transducers utilizing high temperature ceramic vibrating elements to develop a uniform intensity ultrasonic field across the tank. This system can be used to clean such parts as complete turbine blade assemblies, automobile engine blocks, typewriters and other business machine assemblies, complex gear assemblies, and trays of smaller parts. A fused control box is included with the transducerized tank to indicate the operating condition of each transducer.



E—515. Heat Exchanger—Camac exchangers which are designed specifically for heating or cooling of plating, anodizing and pickling solutions are now available in a wide choice of materials from Carl Buck & Assoc.

These exchangers can be provided with graphite, steel or alloy tubes. Matching pumps are available in plastic, steel, stainless steel or rubber-lined. Fittings are offered in Furacam, molded rubber or PVC.

Pumps are sized to provide exact flow required for all units regardless of size and range from 50 to 1200 GPM. The exchangers can be furnished with or without built-in temperature controller.

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Accurate ph values in a few seconds right at the tank.

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Indicator AND control-colors on SAME strip. Control-colors in steps of 0.2 pH and 0.3 pH.

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3650	(•3.6–5.0 pH)	7387	(7.3– 8.7 pH)
2439	(•2.4–3.9 pH)	8610	(8.6–10.0 pH)
1028	(1.0–2.8 pH)	10113	(10.1–11.3 pH)
0414	(0.4–1.4 pH)	11131	(11.0–13.1 pH)

•Electrometric Values in Nickel Solutions.

Each range is boxed separately.

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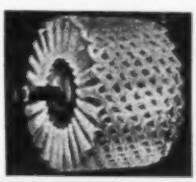

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Harder CRACK FREE deposits. Increased throwing power. Less sensitivity to sulfate content. Exceptionally fine results plating anything calling for Decorative or Hard Chrome.

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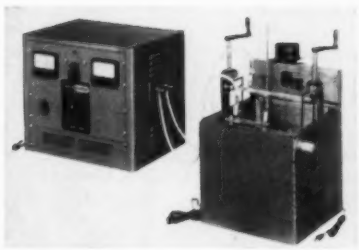


E—516. Chrome Plating Unit—The new Model A, No. 75 chromplater, is now being offered to industry by the Dawson Corp. in a completely packaged unit for plant maintenance. This plater has been designed for prolonged cutting tool life, salvaging worn parts, plating friction parts against wear, and for protection against rust and corrosion. It will deposit from 0.0001 to 0.010 in. of chrome on taps, dies, drills, reamers, form tools, shafts, gears, stamping tools, molding dies for plastics, and on all types of worn steel, cast iron or non-ferrous metals. This unit is claimed to apply an extremely hard plate with low heat and friction properties thereby multiplying wear life up to ten times. The package as offered consists of a 75 amp rectifier, water jacketed lead plating tank, thermostatically controlled electric heating unit, work platform with elevating apparatus, exhaust intake hood, electric blower, two gallons solution concentrate for making eight gallons of plating solution, thermometer, and hydrometer.

E—517. Selenium Rectifier—A high current density, industrial type selenium rectifier especially suited to electroplating operations is being marketed by Radio Receptor Co.

These new rectifiers will have a life expectancy of 100,000 hr when operated at normal ambient temperatures according to the company. At higher ambients the life of the rectifier will not deteriorate if used in accordance with certain derating curves, it is further stated.

Long life, negligible aging characteristics and low voltage drop are attributed to special vacuum technique and processing.

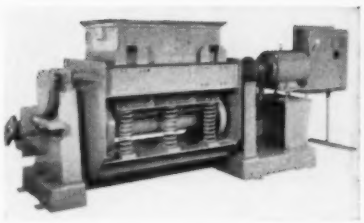
E—518. Fume Reducer—Akweons No. 250, a new acid fume depressant manufactured by Swift & Co., is said to greatly reduce acid fumes in pickling and electroplating operations. It is effective with most acids including hydrochloric and sulfuric acid over a wide range of temperature and acid concentrations. It contains no corrosion inhibition properties so it can be used where etching or acid attack is desirable.

Akweons No. 250 is also a wetting agent and has detergent or cleaning properties for metals in most *p*H ranges.

E—519. Vibrator—New equipment for the descaling, deburring, grinding, fine finishing, coloring and burnishing of all metals and alloys and many plastics is now available. Lord Chemical Corp.'s Lorco vibrator employs the principle of controlled vibration and permits a certain flexibility in vibrational frequencies and amplitudes. The vibrator can be supplied for either fixed or variable amplitudes and frequencies.

In the vibrator, every cubic inch of load is in continuous work motion. In addition, there is also present a "scrubbing action," which is caused by frequency and amplitude.

The new machine is said to handle almost



anything, from extremely coarse work to very fine finishes. It is readily adaptable for use in automated production lines.

Models currently available range from 10 to 30 hp and in bowl capacity from 6.92 to 17.50 cu ft.

(*Continued on page 141*)

The best way to know the results of your industrial waste treatment is to have a permanent record. The kind you get with a W&T O-R-P system

WALLACE & TIERNAN O-R-P SYSTEM...
the sure way to treat poisonous plating wastes

The destruction of cyanides with alkaline chlorination is a controlled certainty. A W&T Oxidation-Reduction Potential (O-R-P) system, automatically controls waste treatment and records the results.

Why use an automatic system? Because there is no overfeeding of chemical; no uncertainty of effluent safety. An O-R-P system samples the treated waste, controls the feeding of the treatment chemicals and records the effectiveness of the treating process.

That's why the sure way of treating your industrial waste effectively is with an O-R-P controlling and recording system. To get the O-R-P story and learn how it works in a major industrial plant, write for Bulletin I-63.00.

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L—501. Radiant Heat—Fostoria pressed Steel Corp. offers literature on their radiant heat metal processing equipment. Infra-red ovens and components are described and illustrated in this eight-page booklet.

Installations of the equipment in metalworking plants are covered and particular attention is paid to the automotive industry.

L—502. Degreaser-Cleaner—A folder has been prepared by Parke-Hill Chemical Corp. describing Parko Grease-Ban its degreasing compound for metals and fabricated parts prior to plating or finishing. The pamphlet shows how the product is used.

L—503. Separators and Filters. Three new bulletins are available from Infilco, Inc., describing their equipment for the continuous cleaning of coolants and cutting oils. Production line applications for coolant separators and filters are outlined as well as applications for the magnetic separator.

The components of the units are described and suggested specifications for these parts are offered.

The booklets also contain helpful illustrations and diagrams.

L—504. PVC Linings—A new handbook, LC-58, covering the three most useful types of polyvinyl chloride lining for corrosion protection is now available from Kaykor Industries, Inc., Division of Kaye-Tex Mfg. Corp.

In addition to a general introduction to PVC lining applications and practices, specific attention is paid to the individual characteristics of conventional flexible lining, special non-toxic white PVC flexible lining, and the recently introduced unplasticized PVC lining, called Fligid.

A table compares both conventional and unplasticized linings in terms of their resistance to a wide range of acids, alkalies, salts, plating solutions, organic compounds, and miscellaneous liquids.

The manual is illustrated with photographs of numerous applications of the materials discussed.

L—505. Ducting Systems—In a catalog just published by American Agile Corp., Agile engineers present details and illustrations of all the necessary components of a polyethylene ducting system.

With this catalog, they say, a prospective user can determine the required components, their exact cost, and the most convenient lengths for installation.

The catalog, entitled "Thermoplastic Corrosion-Proof Ventilating and Exhaust Systems" contains 12 pages and more than 31 illustrations. Specific components and fittings are arranged for ease of reference.

L—506. Deburring Machines—A new 12-page, two-color, illustrated catalog describing automated deburring machines is now available from Acme Manufacturing Co.

The application of various types of deburring tools is discussed. Tools described include wire brushes, abrasive belts, abrasive disks, Tampico brushes, special brushes, polishing wheels, grinding wheels, files and milling cutters.

The balance of the catalog is devoted to illustrations and descriptions of a variety of automatic deburring machines ranging from types specifically designed for low and medium-volume production plants to completely automated types for high production lines.

Large-size illustrations of the deburred parts are included for each machine.

L—507. Buffs—A new 12-page bulletin describing a complete line of cutting and coloring buffs is offered by Hanson-Van Winkle-Munning Co., Inc.

It devotes sections to description and illustration of each of a range of buff types with the manufacturer's recommendation as to applications for which each type is best suited.

Types included are of bias-cut cloth, sisal on a bias, cloth-covered sisal, alternate layers of sisal or cloth in contour patterns and folded cloth construction. Included are lead-center, jewelers' and goblet buffs for jewelers and silversmiths.

Range of specifications for each type is given, including grades of cloth, inside and outside diameters, diameters of arbor holes, thicknesses, densities and sewing patterns. Additional varieties are set forth.

L—508. Demineralization—Graver Water Conditioning Co. has announced the availability of a newly revised and enlarged bulletin, WC-111A, on demineralization (Ion exchange).

In addition to several sections on the application of demineralizers, their basic principles of operation and the chemistry of the ion exchange resins, this bulletin includes detailed information and charts on materials of construction and the design of component parts.

It includes comparison charts on multibed, mixed-bed and scavenger or polishing demineralizers. Layouts of each type of system and operating cycle drawings round out this section.

Other sections are devoted to automatic control, regenerating systems, chemical handling and conductivity measurement.

L—509. Vapor Degreasing—"Vapor Degreasing Using Diamond Perchlorethylene" is the title of a 12-page technical bulletin recently issued by the Chlorinated Products Division of Diamond Alkali Co.

The bulletin presents brief data covering 13 major advantages provided by vapor degreasing in production cleaning and metal surface preparation for electroplating, painting and other finishing operations. Eight reasons that make Diamond perchlorethylene suitable for this important production operation are also outlined.

Related subjects discussed include the essentials of vapor degreasing equipment, methods of scheduling vapor degreaser cleanouts and solvent distillation, and suggested operating procedures. A tabulation of the physical properties of perchlorethylene completes the presentation.

L—510. Fiberglas Tanks—A new brochure illustrating and describing their line of fiberglas non-corrosive type industrial plating tanks is offered by the L. A. Darling Co. Reinforced and resin-bonded tanks are depicted with acid-resistant and non-conductive surfaces. Their strong, lightweight construction and high insulating qualities are pointed out by the company in this booklet.

L—511. Chemical Milling—An illustrated color brochure on chemical milling and metal finishing (30 pages) is now available from Anadite, Inc.

The booklet describes the advantages and engineering applications of chemical milling and the operations involved both pictorially and graphically. Also included in the brochure is information on the Dow and HAE Processes (processing of magnesium), color anodizing, anodizing, vacuum cadmium plating and other important metal finishing processes.

L—512. Rhodium Plating—A new 24-page booklet, published by Sel-Rex Corp. tells where, when and how to use Rhodium Electroplate for electrical, electronic and other exacting industrial applications.

Essentially a technical exposition of rhodium's metallurgical properties, available to industry through several electroplating formulations, the literature features graphs and charts showing rates of deposition under various operating conditions. Some of the detailed information provided: bath preparation and control; determination of rhodium in plating solutions; equipment required; current densities, and general operating instructions. A workable formula for computing the cost is also included.

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ASME Handbook Metals Engineering-Processes. Sponsored by the Metals Engineering Handbook Board of the American Society of Mechanical Engineers. Edited by Roger W. Bolz, Editor, **Automation.** 448 pp. illustrated. AES members $11.25, non-members $13.50.

In this handbook are detailed data on the various processes by which metals are converted into finished products. Composed of 45 sections, the book covers such areas as the heat treatment of steel, casting, hot and cold working, powder metallurgy, welding, machining and electroforming.

For each of the manufacturing methods there is a compilation of the basic physical characteristics to be considered and the general advantages and limitations usually encountered. Concise, parallel data concerning the suitability of various metals for each process, and the natural tolerances on size and surface finish obtainable, assist in evolving designs that meet all functional requirements consistent with economical production techniques.

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High Temperature Protective Coatings for Magnesium. C. R. Fitzgibbon, E. H. Miller, and M. A. Glaser, Midland Industrial Finishes Co., for Wright Air Development Center, U. S. Air Force. 112 pp. Order PB 131073 direct from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., $3.

The book is the last and final volume of the four-volume ASME Handbook.

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Radioisotopes, Special Technical Publication No. 215, 100 pp. AES members $2.50. Nonmembers $2.75.

This symposium covers testing techniques utilizing radioisotopes and demonstrates the wide range of industrial applications to which they may be put. Changes in physical properties of materials as a result of radiation are discussed in some of the papers. Extensive references and many illustrations may be found in the book.

The use of radioisotopes in industry is saving hundreds of millions of dollars each year in terms of process and product improvements and knowledge gained. In the symposium the reader will find broad information on radioisotope tracing. Case histories are presented ranging from electroplating studies, the evaluation of rubber deterioration, and the mechanism of detergency, to the analysis of trace materials by neutron irradiation and the achievement of process control via tracers during full-scale petroleum refinery operations.

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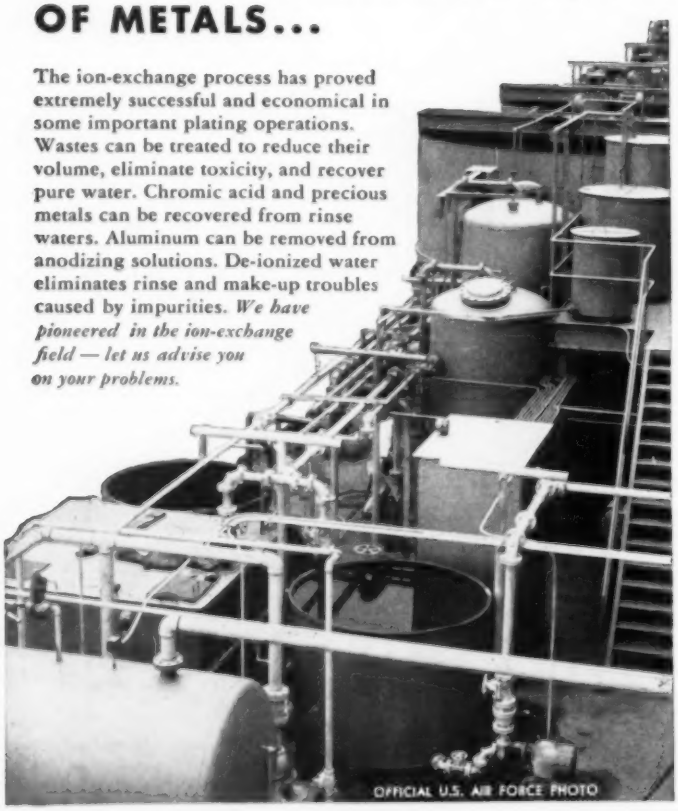
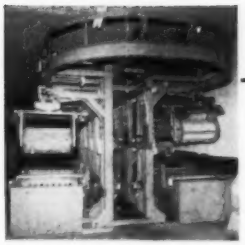
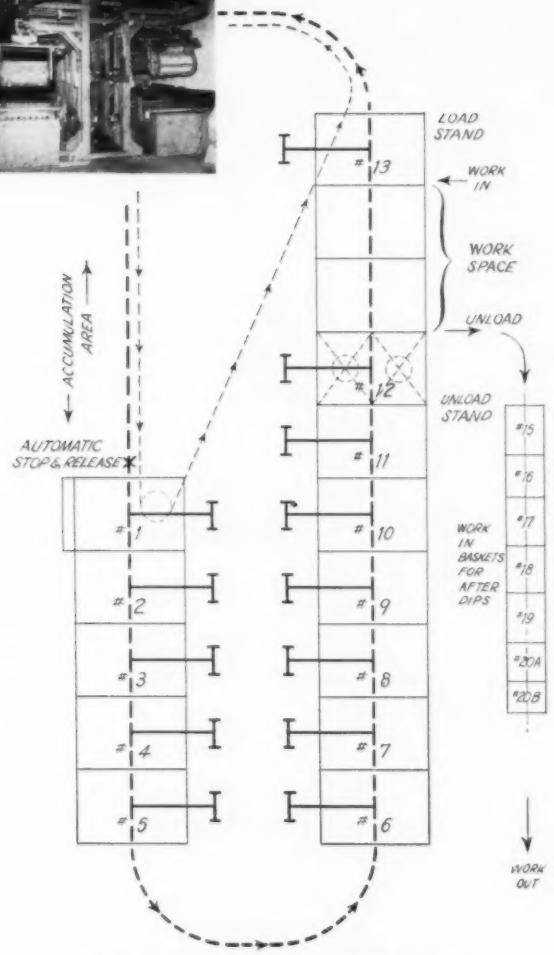




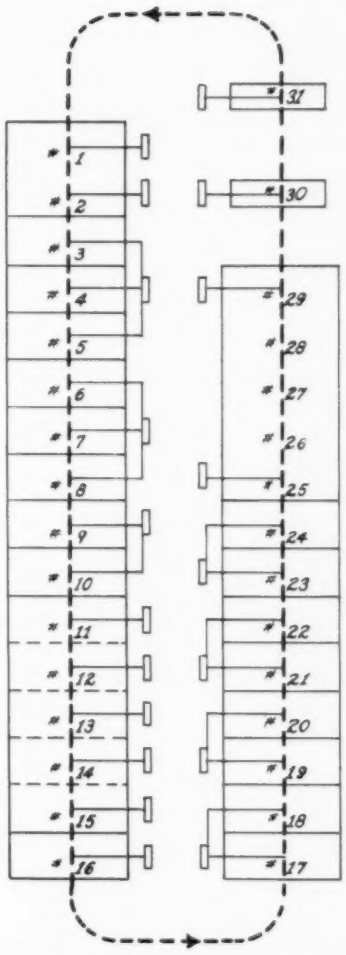


BBL PLATING AUTOMATION CYCLE

Station	Cycle
1	Electro-Clean
2	Warm Rinse
3	Acid Dip
4	Cold Rinse
5	Cyanide Dip
6	Zinc Plate
7	Zinc Plate
8	Zinc Plate
9	Brass Plate
10	Rinse
11	Rinse and Spray
12	Unload
—	Space
—	Space
13	Load
14	Accumulation and Feed

POST TREATMENT CYCLE

Tank No.	Description
15	Chromate Brite Dip
16	Rinse
17	Bleach
18	Cold Rinse
19	Hot Rinse
20a & b	2 Centrifugal Dryers



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Station	Cycle
1, 2	Soak Clean
3	Cold Rinse
4	Soak
5	Cold Rinse
6	Deoxidize
7	Cold Rinse
8	Bright Dip
9	Warm Rinse
10	Cold Rinse
11-15	Anodize
16	Cold Rinse
17	Neutralize
18	Cold Rinse
19	Dye "A"
20	Cold Rinse
21	Dye "B"
22	Cold Rinse
23	Ni Acetate
24	Cold Rinse
25-29	Hot Water Seal
30	Unload
31	Load

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Photostat or microfilm copies of articles in available magazines may be obtained from: Library of Congress, Washington, D. C.; New York Public Library, New York; Engineering Societies' Library, New York, at prevailing rates. In other cases, consult Wilson's Union List of Serials at your nearest public library for other sources of these articles.

43. CADMIUM

a. *CADMIUM PLATING: HOW TO AVOID EMBRITTLEMENT.*
Steel, *141*, November 11, 1957, pp. 132–134.

44. CHROMIUM

a. *FINISHING FACILITIES FOR A MODERN RAILROAD.*
Gerard H. Poll Jr.
Products Finishing, March 1958, pp. 24–35.

45. CLEANING

a. *THE PRINCIPLES OF CLEANING BY ULTRASONICS. PART II.*
Henry B. Fried.
Ultrasonic News, March 1958, pp. 18–19, 23.

b. *SOME ASPECTS OF CLEANING PRIOR TO METAL FINISHING.*
Bruce Whitehead.
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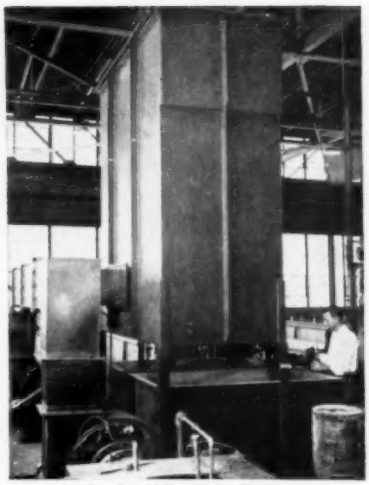
46. COATINGS

a. *THE SELECTION AND USE OF PHOSPHATE COATINGS AS PRETREATMENTS FOR ORGANIC FINISHES.*
R. F. Drysdale.
Electroplating and Metal Finishing, *11*, No. 2, February 1958, pp. 51–55.

47. CORROSION

a. *CORROSION OF METAL SURFACES IN TROPICAL CLIMATES. (German).*
O. Marsch
Werkstoffe und Korrosion, *8*, November 1957, p. 688.
"Tropical conditions are simulated by testing products at 40C and 90 per cent relative humidity. Products



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made of nonferrous metals or with varnished surfaces are preferred. Electric equipment with bright surfaces must be electroplated with Cu, Ni, Zn, Au or Ag. Sweating of insulating materials causes corrosion."

b. *PREVENTION OF LOCALIZED CORROSION IN SULFURIC ACID HANDLING EQUIPMENT.*
G. A. Nelson.
Corrosion, *14*, No. 3, March 1958, pp. 45–49.

48. EDUCATIONAL

a. *ELECTROCHEMISTRY AND THE PLATER. PART III.*
Fred G. Brune.
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a. *RESEARCH ON THE ELECTRODEPOSITION OF ZIRCONIUM, NIOBIUM AND VANADIUM FROM NONAQUEOUS MEDIA.*
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D. O. Bartl and O. Mudroch.
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George C. Field.
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A. V. Pomosov and L. I. Gurevich.
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b. *BRIGHT NICKEL PLATING RESEARCH ON THE INFLUENCE OF ORGANIC ADDITION AGENTS.*
Eugenio Bertorelli, Ignazio Bellobono and Corrado Bordonali.

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Instituo Lombardo di Scienze e Lettere, Rendiconti, *91*, No. 1, 1957, pp. 55–67. (*Italian*).

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a. *A REVIEW OF AIRLESS AND ELECTROSTATIC SPRAY PAINTING.*
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b. *NEW PLASTIC STAYS STRONG AT HIGH TEMPERATURE.*
The Iron Age, *181*, No. 12, March 20, 1958, p. 112.

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a. *HOW GRIT BLASTING IMPROVES PHOSPHATE COATINGS.*
Jacob Knanishu.
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55. PHYSICAL PROPERTIES

a. *WEAR RESISTANCE: IS MELTING POINT THE KEY?*
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a. *SPRAY CLEANING, PICKLING AND PHOSPHATING. STUDY OF OPERATING CONDITIONS.*
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L. Serota.
Metal Finishing, *56*, No. 3, March 1958, pp. 72–75.

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Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,817,601, December 24, 1957—Impregnating Porous Metal Articles—D. Shigley, assignor to General Motors Corp., Detroit, Mich.

Mix cupreous metal and ferrous metal with an impalpable, refractory powder (1–6 per cent) and place on ferrous part, heat to melt cupreous metal which will dissolve at least a part of the iron and impregnate the porous metal part.

2 claims, figure.

No. 2,817,627, December 24, 1957—Bright Brass Plating—B. Ostrow, N. Belmore and F. Nobel, N. Valley Stream, N. Y.

The bath contains copper cyanide complex, zinc-polyamine and an alkylpolyamine having at least two amino groups, the alkyls having 2–8 carbons and the polyamine molecular weight being up to 1800.

26 claims.

No. 2,817,628, December 24, 1957—Antimony Plating Bath—E. Breining and W. Vincent, assignors to General Motors Corp., Detroit, Mich.

The bath contains 20–165 g/l of metallic antimony and a complexing agent capable of complexing dissolved antimony to form a 5-membered ring, i. e., sulfonated catechol (20–300 g/l).

4 claims.

No. 2,817,629, December 24, 1957—Antimony Plating Bath—C. Smart, assignor to General Motors Corp., Detroit, Mich.

The bath described contains 18–20 oz/gal of sodium citrate, 6–7 oz/gal of citric acid, 10–12 oz/gal of antimony potassium tartrate and 0.5 oz/gal of sodium benzrate. Temperature, 125–140F. and *p*H, 4–6.

3 claims.

No. 2,817,630, December 24, 1957—Producing Titanium and Zirconium—R. Dean, assignor to Chicago Development Co., Riverdale, Md.

Titanium and zirconium can be plated out on an inert cathode from a molten bath of alkaline and alkali earth chlorides into which is introduced chlorine and the tetrachloride of the metal being deposited. See also No. 2,817,631 describing refining of titanium alloys—5 claims—assigned by W. Gullett to Chicago Development Co.

1 claim.

No. 2,817,895, December 31, 1957—Soldering Flux—G. Cunningham and A. Yee, assignors to Horizons, Inc., Princeton, N. J.

To solder aluminum to Al, Cu, and alloys thereof, use 9 parts by weight of zinc chloride and 1 part by weight of NaCl (5–29 per cent) KCl (21–61 per cent) and LiCl (29–66 per cent) and heat to 720F. See similar soldering patents assigned to same corporation—No. 2,817,489 (4 claims) and No. 2,817,895, (5 claims).

4 claims.

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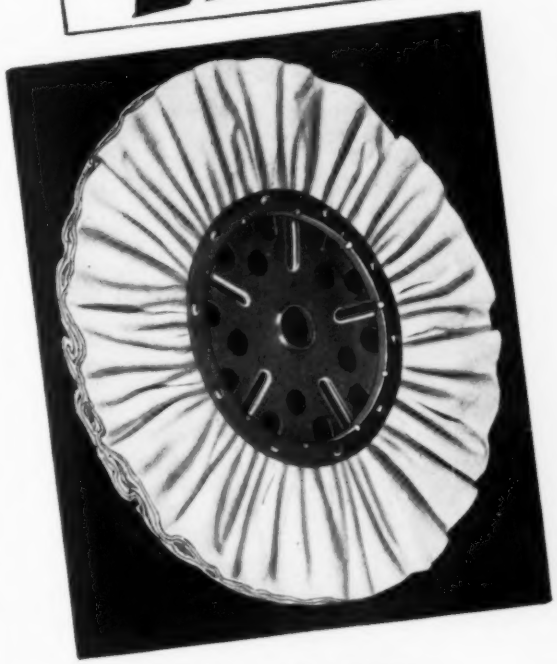

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No. 2,818,075, 12/31/57—Cleaning Metal Strip Continuously—R. Dunlevy, et al., assignors to Kolene Corp., Detroit, Mich.

An apparatus for cleaning metal strip continuously by passing the strip through the molten alkali bath.

1 claim, 2 figures.

No. 2,818,351, December 31, 1957—Plating Glass Fiber Rovings—H. Nack and J. Whitacre, assignors to Commonwealth Engineering Co., Dayton, Ohio.

A method is claimed involving the use of iron pentacarbonyl.

2 claims, figure.

No. 2,818,374, December 31, 1957—Plating Cadmium Indium Alloys—A. Certa and T. Manns, assignors to Philco Corp., Philadelphia, Pa.

The indium and cadmium are dissolved in a bath containing a polybasic acid forming complexes of said metals and electrolysis carried out at a temperature such that the molten entetic Cd-In is plated out. Example I describes the bath as 10 g of NH_4Cl, 4.1 g $CdCl_2$, 14.5 g of $InCl_2$ in 100 g of glycerin. Heat to 140F., add 35 g of ethylene diamine and electrolyze.

12 claims

No. 2,818,376, December 31, 1957—Nickel Plating—D. Foulke and O. Kardos, assignors to Hanson-Van Winkle-Munning Co, Matawan, N. J.

A nickel plating process is claimed wherein 0.005 to 0.5 g/l of thiomalic acid per liter is added to the bath.

10 claims.

No. 2,819,187, January 7, 1958—Chemical Nickel Plating—G. Gutzeit, et al, assignors to General American Transportation Corp., Chicago, Ill.

A chemical nickel plating solution is described containing nickel and hypophosphite ions, a complexing agent (NH_4^+ ions) and an exhalting additive (monocarboxylic aliphatic acids with 3 to 5 carbons as well as dicarboxylic and aminocarboxylic acids. See also (11 claims) No. 2,819,188, describing a method of chemical nickel plating calling for injection of an inert gas into the plating solution.

8 claims.

No. 2,819,193, 1/7/58—Treating Metal Surfaces—W. Rausch, assignor to Parker Rust Proof Co., Detroit, Mich.

An aluminum conversion coating bath is described as containing 10–100 g/l of an alkali metal phosphate, 0.1–3.0 g/l of an alkali metal chromate, and 3–30 g/l of oxalic acid dihydrate, operated at a *p*H of 1–3.

10 claims.

No. 2,819,207, January 7, 1958—Enameling Steel—G. Shephard, assignor to Republic Steel Corp., Cleveland, Ohio.

Clean the ferrous article, deposit spongy, burned cobalt or nickel thereon, then cover with enamel slips and fire. The plating is done with a lead anode about 1 in. from the object from a solution containing 100 g/l of ammonium sulfate and 10 g/l of nickel or cobalt sulfate.

4 claims.

No. 2,819,208, January 7, 1958—Chromizing—P. Galmiche, assignor to Office National d'Etudes et de Recherches Aerona-

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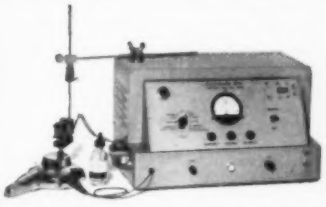

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tiques O.N.E.R.A., Chatillon-sous-Bagneux, France.

Iron and copper base metals are first plated with nickel, cobalt or manganese then exposed to the action of chromium fluoride vapors at a chromizing temperature below the melting point of the article.

4 claims.

No. 2,819,982, 1/14/58—Production of Silver Mirrors—W. Westerveld, et al., assignors to North American Philips Co., Inc., New York, N. Y.

The mirror is made by evaporating a silver silicon alloy, very low silicon—from a hot filament.

3 claims.

No. 2,819,992, 1/14/58—Carburization of Steel—C. Albrecht, assignor to Deutsche Gold- and Silver-Scheideanstalt, Frankfort am Main.

Ferrous metals may be carburized by introducing into a fusion mixture of 75–95 per cent $BaCl_2$ and 25 to 5 per cent of an alkali metal cyanide at a temperature of 1000C or better.

3 claims, figure.

No. 2,820,003, 1/14/58—Composition for Smoothening Metal Surfaces—J. Logan and A. Vujaklia, assignors to Chem-Metals, Inc., Pittsburgh, Pa.

It is claimed the surface roughness of a low alloy steel surface can be reduced from 30 to 6 rms by first immersing in a bath (1–10 minutes) of sulfuric acid, 50 to 78 per cent, containing 0.1 to 2.5 oz/gal of NO_2 as a soluble nitrite at 155–215F. This is followed by polishing with an abrasive under 100 mesh and a second immersion in the sulfuric acid-nitrite solution.

17 claims.

No. 2,820,004, 1/14/58—Current Density Control—G. Rendel, assignor to U.S. Steel Corp., N. J.

A current density control applicable to the control of generator current used to remove material from strip passing through an electrolyte is described.

2 claims, figure.

No. 2,820,005, 1/14/58—Lead Anode—W. Belke and H. Johnson, assignors to Belke Mfg. Co., Chicago, Ill.

An anode with V-shaped corrugations coming together at the top of said anode is described.

6 claims, figure.

No. 2,820,723, 1/21/58—Inhibition of Corrosion of Phosphated Metal Surfaces—W. Le Suer, assignor to The Lubrizol Corp., Wickliffe, Ohio.

Phosphated surfaces can be inhibited from corrosion by laying

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down a film thereon which comprises the reaction of:
a) a zinc salt of phosphorodithioic acid with
b) an approximately equivalent amount of an organic epoxide containing 4 aliphatic carbon atoms.
11 claims.

No. 2,820,731, 1/21/58—Phosphate Coating Composition—E. Heinzelman and S. Wiliamson, assignors to Oakite Products, Inc., New York, N. Y.

A phosphate coating bath is described consisting essentially of an aqueous solution containing per gallon at least 0.6 oz of zinc or manganese, said metal being present in the form of a compound at least about 0.07 oz of an oxidizing anion, phosphoric acid and at least 0.0009 oz of zirconium.
10 claims.

No. 2,820,745, 1/21/58—Electrowinning Titanium—F. von Bichowsky, Wilmington, Del.

The use of a $CuCl_2$-$TiCl_4$ complex in an organic solvent is described.
4 claims.

No. 2,820,747, 1/21/58—Method for Treating Tin Surfaces—R. Fredrickson, assignor to Metallic Manufacturing Co., Chicago, Ill.

Make the tin surface anodic in a bath containing 1–15 oz/gal of a water soluble alkali metal hydroxide and 0.5–5 oz/gal of a soluble chromate followed by baking at 300F or above to form a drab discoloration on the tin.
6 claims.

No. 2,820,748, 1/21/58—Electrowinning Zirconium and Hafnium—F. von Bachowsky, Wilmington, Del.

Dissolve a complex of the metal with Li, K, NH_4, Cu, Hg and Cd salts with same anion as the metal (Zr or Hf) in an organic solvent such as ethylene glycol, etc. and electrolyze.
8 claims.

No. 2,821, 505, 1/28/58—Bismuth and Bismuth Alloy Plating—J. Beach, assignor to U.S.A. (A.E.C.)

A binary bismuth alloy is produced by nickel plating then depositing bismuth on the nickel from a bath containing 100 g/l of bismuth chloride, 18.5 g/l of sodium chloride, and 210 cc of 38 per cent hydrochloric acid using alternate cathodic and anodic current. Finally the nickel and bismuth are alloyed by diffusion heating.
7 claims.

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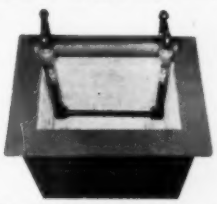

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PERSONALS

V. E. Bowes

G. S. Johnson

Vincent E. Bowes has been promoted to Midwestern regional sales manager by Kelite Corp.

Mr. Bowes joined Kelite in February, 1957 as petroleum service manager. Prior to that, he was associated with Oakite Products, Inc. and with Consolidated Edison, New York.

Mr. Bowes will make his headquarters at Kelite's manufacturing facility in Chicago.

George S. Johnson has been promoted to district sales manager by Kelite Corp.

Mr. Johnson has served Kelite for seven years, in personnel work and as sales supervisor and sales engineer. He is a member of the AES.

In his new position, Mr. Johnson will be in charge of sales in the Indianapolis District, of the Midwestern Region. His headquarters will be in Indianapolis.

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W. Whalen

G. L. Moran

Gerald L. Moran has been appointed as vice president of the Chemical and Metallurgical Division of Sylvania Electric Products Inc.

Mr. Moran also will continue as general manager of the Chemical and Metallurgical Division.

General manager of the division since November, 1957, Mr. Moran previously had been division chief engineer since 1954. His office will remain at division headquarters in Towanda.

William Whalen, president of the Canadian Hanson and Van Winkle Company, has been elected chairman of the company's board of directors, and **Arthur C. West,** vice president and general manager, has been elected as president and general manager.

Mr. Whalen joined Canadian Hanson and Van Winkle in 1921. He served as general sales manager, assistant general manager, general manager and vice president before becoming president in 1955.

Mr. West joined the company as chief chemist in 1934, was appointed assistant general manager in 1945, and vice president and general manager in 1956.

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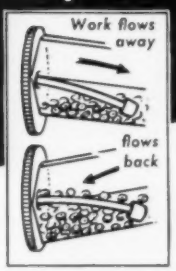

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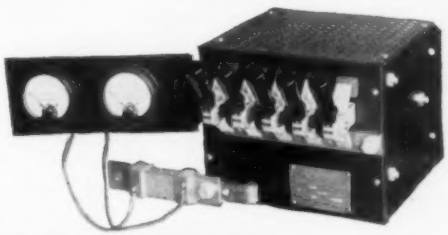

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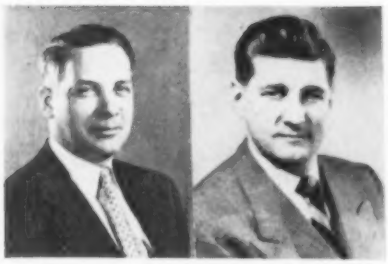

G. E. Parisho E. A. Lord

George E. Parisho has been appointed district manager of the midwestern territory comprising the states of Missouri, Iowa, Illinois, Wisconsin and Minnesota, and **Elmer A. Lord** has been appointed district manager of the Eastern Pennsylvania and Northern Ohio territory of Cowles Chemical Company, Cleveland, Ohio.

Mr. Parisho has been sales and service representative since he first came with Cowles five years ago. He is not only widely experienced on metal cleaning and finishing, but on phosphate coatings as well. He makes his home in Davenport (Bettendorf), Iowa.

Mr. Lord came with Cowles in 1948 shortly after he graduated from Western Reserve University. His first few years with Cowles were spent in the sales promotion department, then he was transferred to heavy chemical sales and three years ago was appointed to the metal finishing chemicals department. He makes his home in Cleveland (Willowick), Ohio.

Bruce W. Dutter has been appointed a technical representative for Cowles in the Pittsburgh area which also includes Wheeling, West Virginia.

For the past three years he has been assistant to William Robinson, head of Cowles metal cleaner service laboratory, and prior to that time was assistant engineer, Easy Washing Machine Corp., Syracuse, New York. He brings to his present position knowledge of the uses and applications of metal cleaners as well as the general subjects of plating and phosphatizing. His home is in Pittsburgh.

Dr. Miro A. Grottger, chemical engineer of Norristown, Pa., has joined Industrial Finishes Co. of Philadelphia as vice president and director of Research.

He will assume complete charge of all basic research; direct product research and testing; and further act as a special field consultant on customer protective coating problems.

Dr. Grottger holds a professional engineer's license from the State of Kentucky and a PhD in chemical and industrial engineering from Chicago University's McKinley Graduate College. He is a member of the Kentucky Society of Professional Engineers, American Federation Paint and Varnish Production Clubs, and the American Society of Testing Materials.

Before joining Industrial Finishes, he was chief chemist and director of research and development for Walker Brothers of Conshohocken, Pa.

Dr. Sydney Steele has been named director of public relations for Atlas Powder Co.

Dr. Steele joined Atlas in May, 1950, as manager of market research.

Before joining Atlas, Dr. Steele was with Fischer & Porter Co., Hatboro, Pa., and the Du Pont Co.

He received his bachelor's degree in engineering from Christ's College, Cambridge University, England, in 1928, and his master's degree and doctorate from the same institution in 1932, also in engineering. He continued postgraduate research in chemistry, physics and engineering at Johns Hopkins University and at Harvard University.

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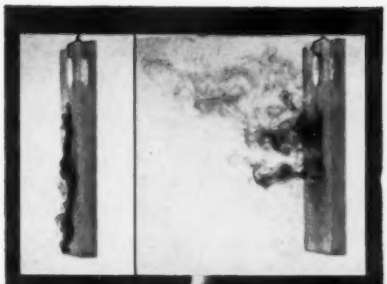

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He is a member of the American Institute of Chemical Engineers, the Chemical Industry Association, and Sigma Xi; and is chairman of the Commercial Chemical Development Association's Education Committee. He holds membership in the Chemists' Club (N. Y.) and the Harvard Club (Delaware).

Spencer Ross, previously with Volco Brass & Copper Co., simultaneously was appointed assistant to Mr. Campbell. Each man has over 20 years' sales executive experience in the non-ferrous metals industry.

Harold S. Samson, previous New York branch manager, will stay on as consultant following his return from vacation.

Herbert M. Appleton has been named assistant to George N. Proctor, vice president and general manager of the Permutit Company, A Division of Pfaudler Permutit Inc. Recently, Mr. Appleton had been made manager of the industrial engineering department and, in addition to his new duties as assistant to the general manager he will retain temporarily this former responsibility.

H. M. Appleton

D. G. Dutcher

Donald G. Dutcher has joined Hanson-Van Winkle-Munning Co. as chief electrical engineer.

Following on the heels of H-VW-M's announcement of a major reorganization of their engineering division, Mr. Dutcher's appointment was stressed as part of the firm's plan to improve and expand its research and development programs. To this end, the company is building new mechanical and electrical laboratory facilities and expanding facilities of its electrochemical laboratory.

The changes have particularly affected the plating, anodizing and allied processing fields, especially those involving conveyor automation controls and DC current equipment.

A graduate of the State University of Iowa, with a degree in electrical engineering, Mr. Dutcher previously held the position of chief electrical engineer with W. F. and John Barnes Co. and Ipsen Industries.

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Simon P. Gary has been named vice president of Scientific Control Laboratories, Inc. Mr. Gary has practiced as a chemical engineer and consultant in the electrochemical and metal finishing fields since his graduation from Rose Polytechnic Institute in 1941. He brings to his new assignment a considerable background of theoretical and practical "know-how" gained through his various positions which include: chemical engineer in the Research Division of Prest-O-Lite Battery Corp., and in the Allison Division of General Motors Corp., following which he served as a research engineer for Plastic Platers, Inc., until the close of the war when he joined the staff of Scientific Control Laboratories as a research engineer and consultant where he remained until 1950. In 1950 he became plant manager of Grunwald Hard Chrome Plating Co. where, in addition to his duties of management, he developed methods and processes for the production of electrodeposited chromium for industrial and engineering uses. In 1957, he rejoined the staff of Scientific Control as a consultant and as director of the quality control laboratory.

S. P. Gary

O. J. Brown Jr.

Oliver J. Brown Jr., has been appointed manager of continuous equipment sales, the Hanson-Van Winkle-Munning Co. Mr. Brown was formerly in charge of engineering for the company's continuous strip plating and cleaning systems.

His appointment as manager of continuous equipment sales indicates an intensified interest by the firm in this field of metal finishing. A continuous strip test department was recently announced, and a strip line was placed in operation to accelerate research and development in this field.

Mr. Brown has been with the firm's engineering division since 1937, and has been engaged in design and engineering on continuous strip, conduit and wire plating and anodizing equipment since 1938.

Carl O. Kingsbury retired on March 31. After 21 years as New Orleans branch sales manager for Solvay Process Division, Allied Chemical. Succeeding Mr. Kingsbury is **Charles E. Varn.**

Mr. Kingsbury is a graduate of University of Pittsburgh with a degree in petroleum engineering. He saw action in a number of World War I battles, including Belleau Wood and Chateau Tierry. Wounded in an enemy gas attack, he was awarded the Distinguished Service Cross, the Croix de guerre, as well as the Purple Heart.

Mr. Kingsbury was first employed by Solvay as a salesman at the St. Louis sales branch in 1926. He moved to Solvay's Boston office in 1929 and in 1937 was appointed manager of the New Orleans sales branch.

A native of Virginia, Mr. Varn received a BS degree in biological chemistry from Virginia Polytechnic Institute. He joined Solvay in 1947 as a chemist and three years later became a salesman at Solvay's Charlotte, N. C. sales branch.

Marc Darrin, former associate director of research for the Mutual Chemical Company of America, has retired after a career of over forty years in the chemical industry.

Author of more than 100 published articles on a wide variety of chemical subjects, Mr. Darrin also holds over 50 U.S. and foreign patents.

In 1921, he was named a Senior Industrial Fellow by the Mellon Institute, a post he held for 17 years. He joined Mutual as chief chemist in 1936 and was named associate director of research in 1949. Since last year, Mutual has been associated with Solvay Process Division, Allied Chemical.

Shape of things to Come—in Copper

Plated Moulds, Inc., finds even heavy, intricate molds are plated faster—deposits are smoother, denser, more uniform—with "Plus-4" (Phosphorized Copper) Anodes

"Plus-4"® Copper Anodes have helped Plated Moulds, Inc., Yonkers, N. Y., open up new areas of business in electroformed copper molds for the mass production of intricately shaped products in vinyl plastisols.

A leader in the production of copper molds for dolls and toys, Plated Moulds also pioneered in making the molds for plastic footwear. About three years ago, the company tried "Plus-4" Anodes in its tanks with these results:

1. Deposits were uniform, with excellent density. They had experienced some porosity with ordinary anodes.
2. There were far fewer nodules. This was particularly important in building up shells as thick as ¼".
3. They could plate faster, using higher current densities.
4. Efficiency in copper use was higher because the anodes corroded more uniformly.
5. Tank maintenance was reduced. There was less sulfate—no sludge.

These advantages made it practical and economical to try larger, heavier molds. The hobbyhorse mold illustrated is one result. And Plated Moulds is moving out into the commercial and industrial fields with molds for motorcycle and bicycle seats, automotive assemblies, display models.

Write for information on how you can obtain a test quantity to supply one tank. Address: The American Brass Company, Waterbury 20, Connecticut. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 56134

ANACONDA®

"PLUS-4" ANODES Phosphorized Copper

Made by The American Brass Company

Karl A. Wildason has been named sales manager of Hohman Plating & Mfg., Inc., Dayton, Ohio. He will direct sales activities of Hohman's Surf Kote solid film lubricants and their production metal finishing service.

Mr. Wildason served for many years as the Dayton district sales manager for the DeVilbiss Co. of Toledo.

Ralph I. Preuss has been appointed as sales and service engineer on the New England staff of the American Buff Co. of Chicago. His twenty years of experience, gained as owner and manager of his own fabricating plant producing plastic jewelry and novelties, gives him an understanding of the many problems in finishing operations on all types of materials. He lives in Rockville Centre, Long Island.

K. A. Wildason

W. J. Harper

Willard J. Harper is now with Hanson-Van Winkle-Munning Co. as chief mechanical engineer.

Mr. Harper will head all mechanical design engineering, which has been integrated into a newly created group at H-VW-M to engage in major engineering programs for the development of radically new additions to its equipment and product lines.

A mechanical engineering graduate of the University of Kentucky, Mr. Harper comes to this appointment from the Hydraulic Drives Department of the Westinghouse Electric Corp.

Sidney Klein is now technical services manager of the Penetone Company of Tenafly, N. J. In this capacity, Mr. Klein will be responsible for assisting Penetone's nationwide sales staff on technical matters concerned with the use and application of its line of industrial detergents, degreasing compounds, strippers, corrosion removal and preventive treatments and other chemical specialties.

Mr. Klein brings to the Penetone Company twelve years of industrial experience in the industrial, marine, automotive and aircraft fields. A graduate of New York University, he formerly served as project engineer in charge of chemical operations at the Wright Aeronautical Division, Wood-Ridge, N. J. Later he was a sales engineer with the Chemclean Products Corp. of New York.

Mr. Klein is active in many technical societies including the New York Rubber Group and the AES.

Hans Neumann has been named research supervisor on the staff, and Arthur C. Lansing appointed manager, of the laboratory of the Chemical Division of Michigan Chrome and Chemical Company, Detroit.

Mr. Neumann is a graduate of Leipsig University, with a degree in organic chemistry, and has been engaged in chemical research activities all of his life in industry. He managed a chemical factory in Germany and has been in the United States for eighteen years.

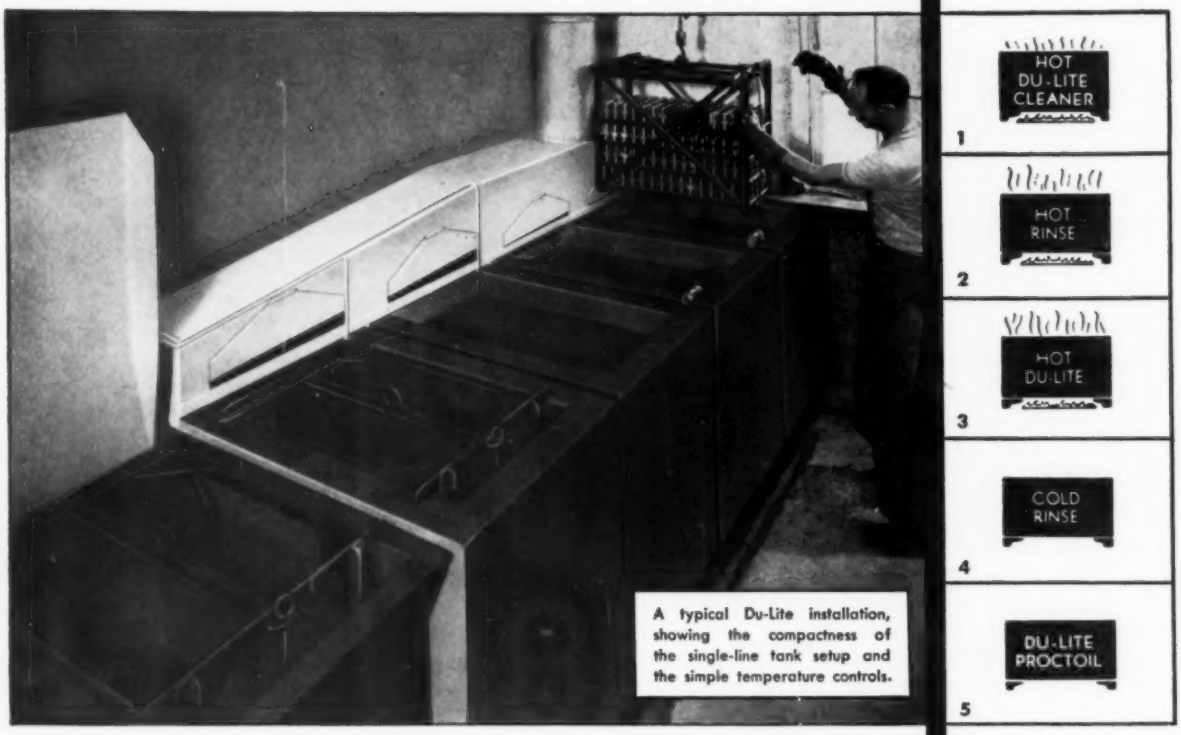
Mr. Lansing is a graduate of Cornell University and took graduate work there and at the Colorado School of Mines. His background includes many years' experience in the engineering, production, evaluation, research and control phases of the chemical industry. In recent years, Lansing has been a consultant in fields relating to chemistry and chemical engineering.

Rene Ramseier is newly named as design engineer for new products and project installations at American Buff Co.

Mr. Ramseier will work on special buff problems and applications, service projects and factory liaison. Born and educated (a BS in mechanical engineering) in Switzerland, he speaks French, German, Swiss and English. His design engineering for Louis de Roll Iron Works in Gerlafingen, Switzerland preceded similar work with U.S. Engineering and Manufacturing Co., Chicago. Although Mr. Ramseier will make his headquarters at American Buff's Chicago plant, he will work closely with all of the company's field sales engineers throughout the country.

At right, the 76-pound electroformed copper mold in which the beautifully detailed, 28" vinyl plastisol hobbyhorses are cast. Plated Moulds, Inc., is now working on molds weighing up to 250 pounds.

Du-Lite METAL FINISHING SPECIALISTS



A typical Du-Lite installation, showing the compactness of the single-line tank setup and the simple temperature controls.

DU-LITE DU-LITE
STEEL COLORING PROCESS

Du-Lite's metal finishing line includes cleaners, strippers, blacking agents, wetting agents, passivating agents, rust preventatives, burnishing compounds etc. for any type of metal. Let Du-Lite solve your finishing problems. Complete Du-Lite service includes free processing of samples of your parts to demonstrate Du-Lite quality and economy, field engineers right near your plant to help you with your steel finishing riddles, and research on specific metal finishing problems.

The Du-Lite process requires five tanks, only three of which require heat, including one with a controlled temperature. The installation may, of course, be as elaborate as individual requirements demand. Setup can be tailored to handle the type and volume of the parts to be finished. Du-Lite engineers will be glad to assist you in planning the installation and securing the necessary equipment. The simplicity of the Du-Lite process may be readily appreciated from the following outline:

Visit us at the Hotel Sinton
45th Annual Convention of the
American Electroplaters' Society

STEP 1 **Clean by immersion for five minutes in a good, hot soak cleaning bath. We recommend Du-Lite #29 cleaner with Titronne.**

STEP 2 **Rinse in hot water.**

STEP 3 **Immerse for five to fifteen minutes in Du-Lite bath at 290° to 300° F. (On certain types of heat treated steel normally requiring immersion for longer periods, time can be saved by immersing in a second bath for five to ten minutes at a higher temperature.)**

STEP 4 **Rinse thoroughly in cold water.**

STEP 5 **Immerse for two to five minutes in water displacing oil, remove, and drain. Du-Lite Proctoil will leave a protective oil film on the surface.**

Du-Lite

THE DU-LITE CHEMICAL CORPORATION · MIDDLETOWN, CONN.

EQUIPMENT & SUPPLIES

(Continued from page 551)

E—520. Solenoid Valve—Valcor Engineering Corp. announces the development of the SV-5100 series of all-plastic, corrosion-resistant solenoid valves, designed specifically to handle most of the corrosive media used in industry.

The 115 v ac, 60 cycle unit features a current drain of 10 w maximum. It is made of molded nylon with a plastic diaphragm seal that assures bubble-tight sealing. Valve may be taken apart for cleaning and inspection without removing it from the lines. All fittings are an integral, molded part of the body.

Glass-impregnated, continuous-duty coil is said to eliminate electrical failures due to moisture. The standard model is equipped with 24 in. pigtail leads.

E—521. Thickness Gage—Production of an instrument, designed for the precise and non-destructive measurement of the thickness of coatings and platings on base materials, is announced by Gulton Industries, Inc.

Known as the Glennite Laminagage, Model FLW-1, it can be used for the thickness measurements of metallic film or foil and will detect surface and subsurface cracks in smooth and rough coatings, flat stock or plate and tubing. In addition it can be used to measure coating thicknesses of odd shaped pieces and pieces on assembly lines.

The gage is also designed for use in automated, process control applications.

Operating on the swept frequency eddy-current principle, it will measure coating thicknesses over the range of 0.00005 to 0.007 in. with an accuracy of 10 per cent according to Goulton. Ferrous and non-ferrous materials and a wide range of conducting and non-conducting coatings on conducting base materials can also be measured.

THE S.A. DAY MANUFACTURING CO. INC.
EST. 1912
45 YEARS OF EXPERIENCE
MANUFACTURERS OF
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POLISHING COMPOUNDS
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For Metal Finishers!
Pressure Moulded NEOPRENE "CAPLUGS"

7 STANDARD SIZES

	A	B	C	D	E	F	G
TO PLUG HOLE SIZE	1/8-3/16	3/16-1/4	1/4-5/16	5/16-1/2	1/2-5/8	9/16-11/16	5/8-3/4
TO CAP STUD SIZE	3/32-5/32	5/32-3/16	3/16-1/4	1/4-5/16	5/16-3/8	3/8-7/16	5/16-1/2

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WRITE FOR FREE SAMPLE KIT.
7075 LYNDON AVENUE
DETROIT 38, MICHIGAN
DUGGAN Masking Devices

USE READER SERVICE CARD; INDICATE A 579.
USE READER SERVICE CARD; INDICATE A 580.

BRANCH NEWS

Total AES Branches U. S., Canada Australia, May 1, 1958—58.

BOSTON

Martin Joins Benedicts; Derman is Speaker

Boston Branch met Thursday, March 6, at the Hotel Statler, Boston, with President **Flores** in charge. Communications were read concerning the withdrawal of **George W. Cavanaugh** of Syracuse as a candidate for National 3rd Vice President, Los Angeles Regional Meeting, and the announcement that the current changes in Bylaws affecting dates pertaining to the new fiscal year were approved by letter ballot of all delegates. **Manson Glover** acted as librarian in the absence of **Wayne Martin** who was off to Bermuda on his honeymoon and presented **Jack J. Dernan** of Behr-Manning who discussed "Abrasive Grinding and Off Hand Polishing." He first presented verbally how the abrasive grain was bonded and the reason for various bonding and protective materials. Various types of back-up wheels were shown and the variation in land sizes explained. A color film was shown which depicted clearly a tremendous series of applications pertinent to finishing and treatments prior to plating. After the presentation of the film it was announced that Behr-Manning would hold a "Metal Show" in Troy, N. Y., June 9 to 13, demonstrating all phases of grinding and polishing with belts with all types of equipment.

George P. Swift
Secretary

BRIDGEPORT

Panel Discussion Makes "Stimulating" Meeting

The regularly scheduled business meeting and educational session of the Bridgeport Branch was held in the main ballroom of the Hotel Barnum on Friday, March 14. President **Floyd Tatum** called the meeting to order at 8:25 p.m. with 38 members and guests present.

Six applications for membership were presented.

Emil Bergen reported the social success of Olde Timers Nite.

F. Tatum said that a rapid sale of tickets reported by all branches indicated a large New England Regional turnout. The entertainment committee said that the ladies would play Bingo.

Dr. W. A. Wesley of International Nickel Co. and **Henry Strow** of Trubrite Chemical are the featured speakers of the Educational Session. An improved approach to the advertising program, as outlined by **George O'Connor** at a recent committee meeting, would be distributed to the branches so that future program chairmen should have an insight into the publication problems.

Joe Haas, Constitution Committee chairman, added **Al Jocis'** name to the committee and said that a crude draft of the proposed bylaws had been distributed to committee members. Progress.

Henry Maskowski of the Outing Committee has selected the site and claims that the first Saturday of August will be fair and warm.

Ray O'Connor and his National Officers' Committee are considering certified members of the branch, one of whom may be selected to be groomed for nomination as National 3rd Vice President.

Al Jocis says he has been advised that it would be necessary to constantly remind the editor of the Bridgeport Post and Telegram of publicity releases.

William Hyatt presented **Joseph Haas** to be the moderator of a panel discussion on copper, nickel, chrome and precious metal plating. The panelists were **Allen Ferguson** on copper plating; **William Lindsay** on nickel plating; **Hubert Goldman** on chrome plating and **Phil Bailin** on precious metal plating. After each panelist had presented his talk, Joe Haas asked for questions from the floor. A very lively question and answer period ensued and the consensus of opinion was that it was one of the most stimulating periods we had experienced at a meeting. A rising vote of thanks was given the moderator and each panelist.

The Syracuse Branch advised us that **George W. Cavanaugh** had withdrawn as nominee for National 3rd Vice President.

The door prize was won by **James V. Morgia.**

Adjournment for refreshments and television viewing of the Friday night fight was at 10:25 p.m.

Bob Parker

BUFFALO

Parliamentarian Cavanaugh Gives Some Rules to Follow

The March meeting of the Buffalo Branch was held March 7, at the Niagara Manor, 899 Niagara Falls Blvd., Buffalo.

After a dinner of delectable viands of wide variety, the group proceeded with the regular business meeting at 8 p.m. sharp.

At least four items characterize the Buffalo Branch: 1) Dinner at 6:30 p.m.—foods second to none. 2) Business meeting starts at 8 p.m. sharp. 3) Unusual roster of interesting speakers. 4) Attendance approaching or surpassing 50 per cent of membership.

Frank Bueckman and **Linwood Morrison,** visitors from the Rochester Branch, gave all a hearty welcome to the Regional, to be held at Rochester April 19. They have planned a program including complete dual sessions on both organic and metallic finishes with top-flight speakers in both fields, and a fashion show for the ladies.

Harold Shapiro, librarian, presented the speaker of the evening, **George Cavanaugh** of the Syracuse Branch. After a variety of attainments in the educational field Mr. Cavanaugh entered industry and at present is a manager of chemical research for General Electric at Syracuse. Of course, I don't have to go into so much detail about Mr. Cavanaugh's versatility, especially concerning the subject of the evening, "Parliamentary Law" for he has become a national figure in the American Electroplaters' Society as Parliamentarian.

Needless to say his clear, concise statement of the use of Parliamentary Law from the history of its earliest uses, to the explanation of his own simplified parliamentary guide, gave the group an insight into a subject which has been seemingly impossible to understand. As Mr. Cavanaugh so aptly put it, the average man can by the application of a few fundamental rules intelligently conduct a meeting or properly participate in group gatherings and enjoy the experience.

Again we extend a welcome to you, if you happen to be near our fair city on the first Friday of each month, from September to May, all meetings with dinner at 6:30 p.m. and business session at 8:00 p.m. sharp. The regular meeting place is Niagara Manor, or call or write the undersigned at Wherle Drive, Clarence, N. Y., telephone Spring 6431.

Ralph D. Stemmerich
Secretary

CAPITOL DISTRICT

Smith Talks on Precious Metal Plating

The Capitol District Branch met on Monday evening, March 3, at the Hot Shoppe, just north of Albany on Route 9. There were 16 members present. After a

ELECTRO POLISH

production pieces *faster–better* with

Electro-Glo SOLUTIONS

- Polishes—Deburrs—Levels
- Saves Time—Labor Costs
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Electro-Glo electropolishing is the modern, economical finishing method in which a fractional amount of metal is removed rather than deposited as in plating. Electro-Glo comes to you as a concentrate, and you purchase the balance of the solution locally. It is used in conventional plating equipment.

Electro-Glo does a multiple job. Deburring, leveling, and polishing take place simultaneously. Any degree of brightness is easily obtained. Electro-Glo concentrates process Copper Alloys, Stainless Steel, Carbon Steel, and less common metals and alloys. The Electro-Glo process is recognized as a superior polishing method, and has an enviable record for Saving Time, Saving Labor, Increasing Production . . . and NO royalties!

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Engineering service available. Sample piece electropolished by the Electro-Glo method without charge. Equipment layout and cost analysis furnished. Special methods and finishes developed. Send for full details.

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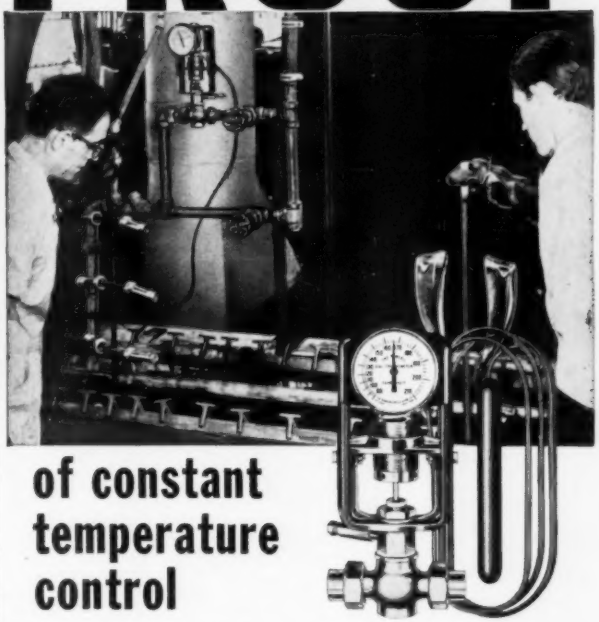

of constant temperature control

for high quality, high profit plating

Simple, compact, and dependable, the Powers No. 11-MF Self-Operating Temperature Regulator assures quality finishes with a minimum of waste. With accurate control of temperatures, your processes can be operated at their most efficient level without danger of costly overheating. Being self-operated, the No. 11-MF requires no external power source.

Easy-to-read four inch dial thermometer provides a fast means of checking controlled temperatures. The plastic covered bulb and tubing assures long life in the various solutions encountered in plating processes. The big double ply metal bellows gives extra valve power and the valve stem lubricator insures complete freedom from binding. Available in several temperature ranges, there's a Powers No. 11-MF Regulator to fit your particular requirements.

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For specifications, valve, types, and temperature ranges, call your Powers branch office—engineering services in over 60 cities. Write for Bulletin 330.

POWERS

TEMPERATURE CONTROL

roast beef dinner President **Bob Wolf** called the meeting to order and asked for a moment of silence in reverence of our departed Past President **Jack O'Connor,** who died last month.

Following a short business meeting, Librarian **Art Eisner** introduced the speaker for the evening, **Frank K. Smith,** president of Technic Incorporated. Mr. Smith has been in the metal finishing field for the past thirty years. Mr. Smith discussed the problems encountered in precious metal plating and brought out the ever expanding and important applications in the nuclear and electronic age. His talk was well received as evidenced by the many questions brought forth by the members present.

John H. Green
Recording Secretary

CHICAGO

Inco Film and Panel on Corrosion Presented

The monthly meeting of the Chicago Branch was held on Friday, March 7, at the Western Society of Engineers. The election of officers for this year was held and the following candidates were elected: President, **R. Scott Modjeska;** 1st vice president, **Charles Geldzahler;** 2nd vice president, **Matt Dassinger;** librarian, **Joseph C. Corre;** secretary-treasurer, **Paul Glab.**

A color film "Corrosion in Action" prepared by the Engineering Section of the International Nickel Company, Inc., was presented. The film is in three parts: 1) The Nature of Corrosion, Anodes and Cathode Processes, 2) Origin and Characteristics of Corrosion Currents, 3) Passivity and Protective Films. The film graphically illustrates how corrosion action occurs and what measures can be taken to stop it.

Dr. Joseph Draley and **Dr. J. H. Monaweek,** both from Argonne National Laboratory in Lemont, Ill., served as a discussion panel on corrosion. Dr. Draley, head of the Corrosion Group in the Metallurgical Division, has published numerous articles on the cause and prevention of corrosion. Dr. Monaweek, of the Reactor Engineering Division, has contributed much to the field of plating through the National Society and our Branch. A very worthwhile question and answer period followed.

Christopher Marzano
Publicity Chairman

Series 105

TANK LINING QUIZ

Will your present tank lining meet all ten conditions below? It will, **and more,** if it's...

Amer-Plate
PVC TANK LINING

	Yes	No
1. Will it adhere directly to concrete without costly metal interlining?	☐	☐
2. Will it withstand hard chrome liquor to 160° F.?	☐	☐
3. Is it unaffected by strong acids and oxidizing materials?	☐	☐
4. Is it resistant to highly corrosive salts?	☐	☐
5. Will it resist alkalis, including 50% caustic soda?	☐	☐
6. Is it insoluble in aliphatic alcohols, glycol and glycerine?	☐	☐
7. Is it impervious to diesel oil, sour crude, aliphatic petroleum hydrocarbons?	☐	☐
8. Is it non-toxic in food and beverage service?	☐	☐
9. Is it also supplied with T-ribbed back, for casting into place in new concrete tanks?	☐	☐
10. Are expert applicators available in all major cities?	☐	☐

If your present tank lining material scores NO on any point that is important to you, it's time to consider the lining that passes ALL the tests... AMER-PLATE POLYVINYL CHLORIDE SHEET! For complete information and name of nearest applicator, write:

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CINCINNATI

Carlson is Speaker: New Officers Elected

The March 26 meeting was called to order by President **Loveless** with 34 members and guests present.

One application for membership was approved.

A motion to have the Annual Stag Picnic on Saturday, June 21, was approved. **Earl Leonhardt,** chairman of the picnic committee, reported that we would have the annual ball game between the platers and suppliers, the horseshoe tournament and special events in the evening.

Chuck Wise reported that **Louis Michelson,** Manager Rocket Engines, Flight Propulsion Lab Department, would be the keynote speaker for the Convention. Chuck also pointed out that help is needed for the Convention and that any who could give some assistance should contact him. **Bob Miller** pointed out that he needed questions for the Panel Discussion, and also six volunteers to help out with two of the educational sessions.

The results of the annual elections are: **Lester A. Helmich,** president; **Donald W. Gusse,** 1st vice president; **William B. Stephenson Jr.,** 2nd vice president; **Gerard H. Poll Jr.,** librarian; **Gordon T. Speers,** treasurer; **David L. Kaplan,** secretary.

The speaker for the evening was **A. E. Carlson** of the Allied Chemical and Dye Corporation. Mr. Carlson spoke on "Plating from Fluoborate Solutions." The speaker pointed out many of the applications of the fluoborate baths, namely: copper used in the phonograph industry and also used for electroforming, tin in the electrotyping field, and many other examples. He summarized by pointing out that the fluoborate baths are being used more frequently, because they are high speed, simple to operate and very stable. After a question and answer

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Serving Platers

And We're Thankful

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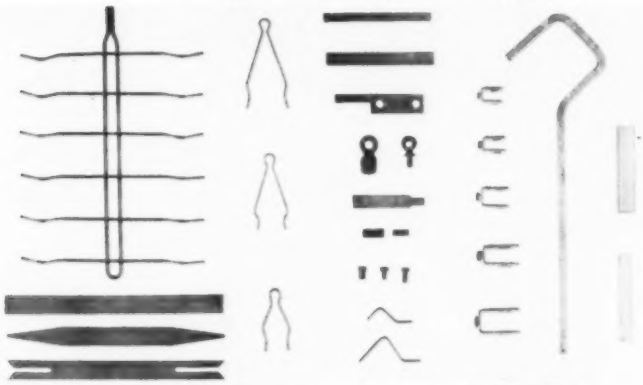
"Stand-It-All" Rack Patch does the complete patching job on your insulated plating racks. One or two coats are ample and it is air dry.
SQUEEZE ME
It's a must for patching after making a tip replacement . .
Injured Areas Are Mended to Perfection With Just a Squeeze of the Tube . . .

NEW! 1958 COMPONENTS FOR

ERECT-A-RACK

For Plating, Anodizing, Painting



"Put Them All Together, They Spell PROFIT"

A wrench is all you need to quickly assemble racks for almost any job. You cut rack preparation time to a fraction, need no bulky equipment. There's no bending, no forming, no holes to drill, no mistakes that can't be rectified in seconds. There IS convenience, ease of operation and, above all, more margin for profit when you use ERECT-A-RACK!

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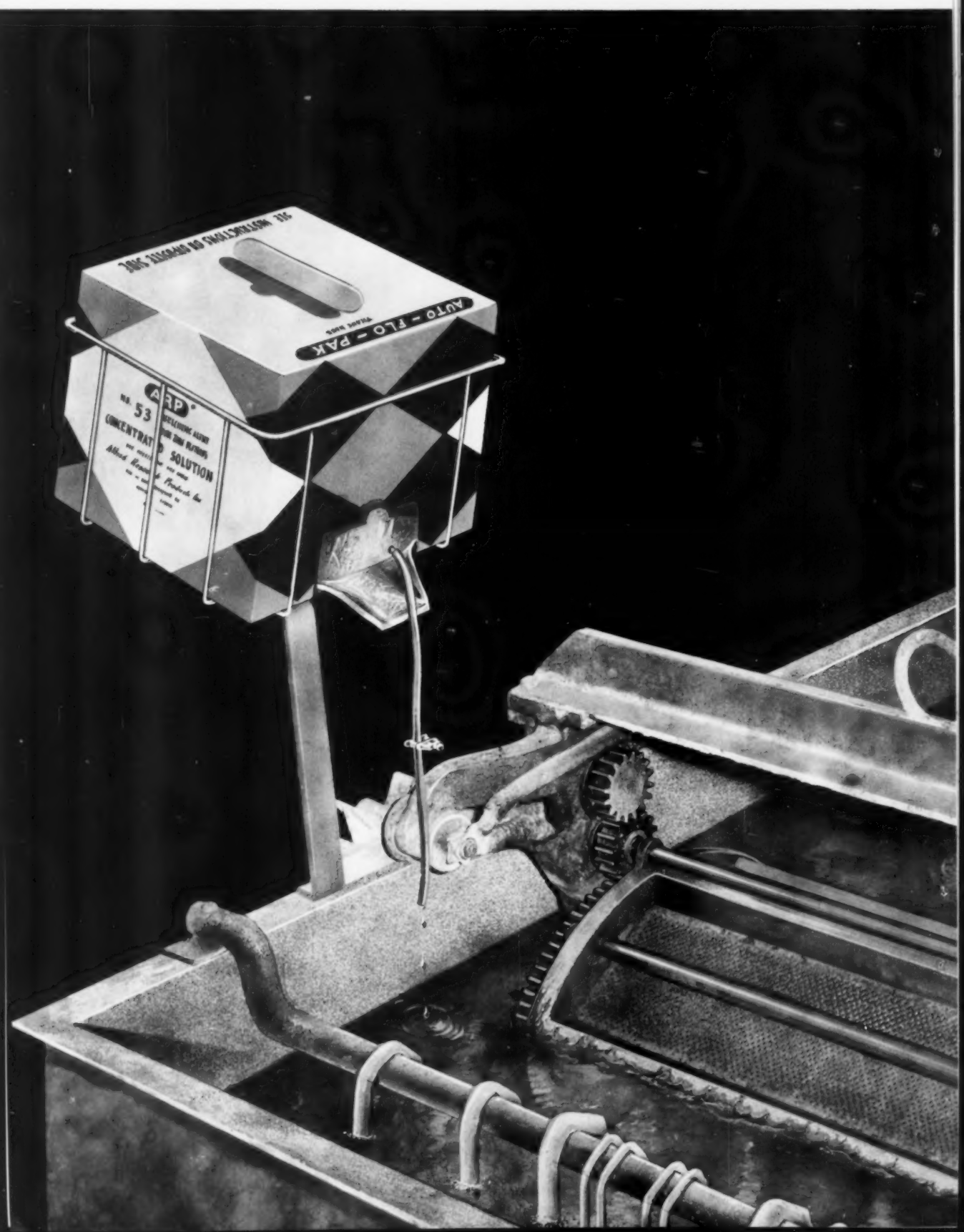

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1—Revolutionary AUTO-FLO-PAK for Liquid Brighteners

TRADE MARK

Provides accurate, steady, automatic feed for more uniform plating, lower plating costs. When used with easy-to-set-up Auto-Flo Dispenser, you get:

AUTOMATIC MAINTENANCE OF PROPER BRIGHTENER LEVEL—This amazing AUTO-FLO-PAK and new brightener dispensing method require only a single setting to assure a constant, peak-efficiency, uniform flow of brightener. There's no danger of adding too little or too much . . . no waste, no muss, no bother.

MORE UNIFORM BRIGHTNESS, MORE UNIFORM PLATE—Each part you plate gets the full effect of brightener as it is fed into the solution . . . helps produce a uniform, diamond-bright plate throughout the entire run.

The AUTO-FLO-PAK consists of a specially designed one-gallon polyethylene container in a cardboard carton. It is designed for use in conjunction with the Auto-Flo Dispenser, consisting of a wire mounting rack and feed tube. The Auto-Flo Dispenser is available from Allied. For those who prefer to pour a specified amount of liquid brightener into the plating solution, the AUTO-FLO-PAK has a handy pouring spout on the top and a measuring window on the side.

The ready-to-use AUTO-FLO-PAK, 6 to a case, is easier to handle and gives better inventory control. You can tell at a glance what you have in stock . . . and you release just the right amount to your production line. The AUTO-FLO-PAK takes up less storage space and can be easily lifted on and off shelves.

The Auto-Flo Dispenser with the adjustable feed tube assembly provides absolute and positive brightener flow control. Once you set it, you forget it . . . and you automatically and constantly get maximum brightness, efficiency and economy. There's little chance of wasting any brightener. The Auto-Flo Dispenser is easily attached to any tank . . . does not interfere with plating operations.

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A great new Liquid Barrel Zinc Brightener that gives you:

LOWER PLATING COSTS—ARP 53 is not only low in purchase price but low in operating costs.

LONGER LIFE—ARP 53 has excellent stability at high temperatures . . . also after shut-downs of the plating bath.

DIAMOND-BRIGHT FINISH—ARP 53 gives bright plate over a wide range of current densities in barrel plating. ARP 53 maintains excellent throwing power and reaches deep recesses easily with uniformly bright deposits . . . provides ideal plated surface for clear bright or colored Iridite coatings.

EASE OF USE—Like all ARP brighteners, ARP 53 is 100% organic in nature, easy to put into use and gives immediate results.

MORE GOOD NEWS FOR ZINC AND CADMIUM PLATERS!

ARP 31 for rack zinc plating and ARP 41 for all cadmium plating are also available in the convenient new AUTO-FLO-PAK . . . at slightly higher prices to cover special packaging.

SPECIAL INTRODUCTORY OFFER!

As a special introductory offer, we'll send you one Auto-Flo Dispenser at a special price of $4.40 with your first order for ARP 53, ARP 31 or ARP 41 in the AUTO-FLO-PAK, 6 to a case. Additional Auto-Flo Dispensers are available at regular price of $8.80. This offer expires JUNE 30, 1958, so clip coupon, fill out and mail today.

PLEASE SEND ME:

_____cases of ARP 53 (9 lbs. per AUTO-FLO-PAK) @ $ .75 lb. $40.50 per case.

_____cases of ARP 31 (10 lbs. per AUTO-FLO-PAK) @ $1.02 lb. $61.20 per case.

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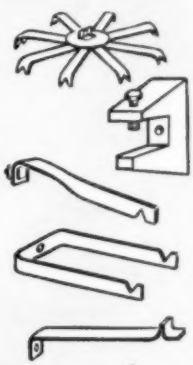

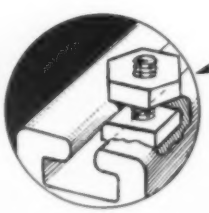

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period, the group adjourned to the social hour sponsored by the Buchanan Supply Co., **Willis O'Brien** host.

David L. Kaplan
Secretary

CLEVELAND

Ivins Presents Paper; Peters Elected President

The regular March meeting of the Cleveland Branch was held Friday, March 7, in the Aviation Room of the Hotel Carter. Guest speaker for the evening was **Clinton F. Ivins Jr.,** Hanson-Van Winkle-Munning Co., who spoke on "Electrical Power Sources for Plating." He developed the advantages and disadvantages of generators and the various types of available rectifiers.

A silent moment of tribute was observed in memory of **E. Steen Thompson,** Erie, Pa., who died on February 21. Mr. Thompson was a Past National President of the Society.

It was also announced that the True Temper Corp., Geneva, Ohio, had been accepted as a new sustaining member by the Society.

Preparations for the annual outing have begun under the direction of **Paul Kadek.**

The monthly meeting for May will be in the form of a plant tour of facilities at the Brown Lipe Chapin Division of General Motors in Elyria, Ohio.

Results of the election for officers for the coming year were: **Robert I. Peters,** president; **John Winters,** first vice president; **Henry J. Seduskey,** second vice president; **James Long,** secretary-treasurer; **Gordon H. Carlson,** librarian; **Ralph Everstine,** assistant librarian; **Morton Van Loan Jr.,** Board of Managers; **Ralph A. Schaefer,** Henry J. Seduskey, **Henry Friedberg,** delegates; **Joseph Rhoads, Theodore Pavlish, John Bohovic,** alternate delegates.

Gordon H. Carlson
Assistant Librarian

DAYTON

Annual Meeting a "Huge Success"

The Dayton Branch opened its 12th Annual Educational Session at 1:30 p.m. Saturday, March 1 at the Hotel Biltmore.

Opening remarks were made by Dayton Branch President **Holle Luechauer. Norbert Mollmann,** Dayton Branch librarian, then introduced Honorary Chairman **Ralph D. Wysong,** National AES 2nd vice president. After making a few remarks concerning the aims of the Society and its growth and the benefits derived from meetings such as this, Mr. Wysong introduced the first speaker. He was **James C. Hesler,** manager of the Water and Waste Treatment Division of Industrial Filter & Pump Mfg. Co., Chicago. The topic was "Procedures for the Recovery or Destruction of Metal Finishing Wastes."

Next to be introduced was **John B. Winters,** president of Incar, Inc., Cleveland, Ohio. Mr. Winter's topic was "The Anode's Side of the Story." **Dr. Frank W. Hightower,** staff engineer, Branson Ultrasonics Corp., Stamford, Conn., followed with "Ultrasonic Cleaning for Plating."

All three papers proved to be very interesting and informative. Each was followed by a lively discussion period.

A demonstration unit operated by the local representative of Branson was on hand for actual cleaning demonstrations after the session.

The banquet in the evening was attended by 496 members and guests who also enjoyed an excellent floor show and dancing to the music of Karl Taylor's Orchestra. As always the Dayton Branch Annual Meeting was a huge success.

R. M. Clinchens
Secretary

DETROIT

Ladies Night: By, With and For the Ladies

Approximately 100 members, their wives and guests met in the Wayne Room of the Statler Hotel on March 7 for our annual Ladies Night. The ladies were welcomed to THEIR night by our genial president, **Glenn Friedt Jr.,** who announced that this meeting is devoted entirely to the ladies and is made possible

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by the success of our annual Christmas Party and Stag Day. **Dick Watson,** president of the Grand Rapids Branch, was introduced by Mr. Friedt and he asked for the Detroit Branch's support for **Chester G. Borlet** in his bid for the AES 3rd vice presidency.

Five applications for membership were submitted by Secretary **Ed Kubis** and were unanimously approved.

The Ladies Auxiliary president, **Mrs. Howard (Betty) McAleer** served as Technical Chairman for the evening and she gave a brief history of the auxiliary and extended an invitation to all Branch members' wives to join this group.

Mrs. McAleer introduced the evening's speaker, **Miss Irene Meyers** of Fort Wayne, Ind.

If there was anyone in the audience dozing at this moment it surely would have meant a shock case for the Branch as the resounding voice of Miss Meyers (without a mike) filled the room. It would be difficult for this reporter to condense the talk, entitled "Magic Flight to Europe," and give all the interesting and heartfelt sidelights of Miss Meyers' experiences as host and chaperone to the all-female groups on their foreign tours. Perhaps the standing ovation, by all present, conveyed the Branch's appreciation for an interesting talk, and equally so, the exciting vocal delivery of Miss Meyers.

After the applause, Miss Meyers was thanked by Educational Chairman **Doug Thomas** and received a bachelor's kiss from our eligible president.

Dancing and refreshments were enjoyed by all till early in the morning to close what was probably the most enjoyable Ladies Night of our Branch history.

Robert J. Amis
Publicity Chairman

HARTFORD
Linford and Feder Present Effect of Oxide Films

The regular Branch meeting was held at the Hotel Bond on March 17 and 51 members and guests were present. Preceding the meeting a movie entitled "Aluminum in Modern Architecture" was shown.

The guest speakers for the evening were **Dr. Henry B. Linford,** director of AES Project No. 12, and **David O. Feder** of the Bell Telephone Laboratories whose subject was "The Effect of Oxide Films."

Mr. Feder spoke first and described the study made of plating nickel on copper tubing containing a film of copper oxide. The equipment used for forming the oxide films on the tubing and the means of weighing this film was described as also was the elaborate set-up for plating in an oxygen free atmosphere using helium as the inert atmosphere. Mr. Feder pointed out that four things can occur when plating over copper: the nickel will plate over the copper oxide, or the oxide can be reduced in the plating process, or the oxide may dissolve, or the oxide may be physically displaced or loosened and fall into the bath.

Dr. Linford elaborated on the above scheme of plating and the effect of oxide films on plate adhesion.

The technical chairman for the evening was **Robert Tiers.**

Stanley Platoz
Secretary

INDIANAPOLIS
Prince Presents Paper: Interim Meeting Reported

On February 5, 40 members and guests attended the Indianapolis Branch regular meeting at Fox's Steak House.

Our vice president, **John Hood,** called the meeting to order. **Addison Howard** introduced **Al Prince** of the Dow Chemical Co., for the educational feature.

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Mr. Prince introduced "Versene" as a chelating agent in chemical terms. The purpose of this complex chemical molecular additive is to stabilize an electroplating solution in relation to the metal ions deposited regardless of the anode efficiency. This chemical complex type is also called EDTA for brevity. Using slides and charts, Mr. Prince gave us a closer working knowledge of its advantages and limitations. Questions and answers followed which indicated the interest and worth of his lecture.

Three applications for membership were presented.

Quentin Shockley moved that the applicants be accepted. The motion seconded and carried.

John Holland read personal letters from National President **Francis T. Eddy** and National Executive Secretary **John P. Nichols** to **Bert Hawhee,** thanking the Indianapolis Branch for the arrangements and successful planning of all the committees for the Interim Meeting.

Ed Bruck reported 24 Branches represented, with 45 delegates as the best attendance of any Interim Meeting to date.

The Branch members were glad to see **Dick Hennessey,** retired honorary member, at the meeting.

John Hood appointed **Roman Bender, Bob Bruck** and **Marshall Whitehurst** as a committee to study and review the Bylaws in relation to dues, and the new National Bylaw requirements.

Les Reynolds reported that details are all worked out for Ladies Night on March 5, to be held at the Sheraton-Lincoln Hotel.

Les Reynolds asked for Branch expression in relation to Tri-State allowing expense for the custodian of funds, when attending National Meetings. Bob Bruck made a motion that Tri-State delegates be instructed to favor a fixed yearly salary to reimburse the custodian. This motion, seconded by **Abe Max,** was carried.

Paul B. Freeman
Secretary

KANSAS CITY
Aluminum Presented by Petit; Stag Party on June 20

The March meeting of the Kansas City Branch was distinguished by a number of outstanding features. To begin with, **R. E. Loupee** of The Davies Supply Company provided cocktails for all the thirty members and guests who assembled in the parlors of the Berkshire Hotel on the evening of March 13. Following the social hour, we were treated to the initial efforts of the new management of the Sans Souci Restaurant in the form of the largest and most appetizing filet we have seen there. Even our heavy eaters were filled.

After the last of the cocktails had been disposed of, the meeting was called to order by the president, **George Becker.** The committee on the Annual Stag Party reported and offered two dates for the Branch's consideration. By a vote of the membership, June 20 was chosen and the committee instructed to go ahead with arrangements.

The matter of the 1959 Interim Meeting of the Supreme Society was brought up, and after discussion, the Branch voted to extend an invitation to hold that meeting in Kansas City. **Bob Garrett, Bill DesJardins, Henry DeWitt,** and **Dick Loupee** were appointed as a committee to draw up and present the invitation and make tentative arrangements.

Announcement of the annual election at the May meeting resulted in the appointment of **Bob Lee** as chairman of the nominating committee with the rest of the committee to be announced at the April meeting.

Four applicants were elected to membership.

The meeting was turned over to Librarian **Scott Sterrett,** who introduced the speaker of the evening, **Ralph Petit,** who spoke on the subject, "Finishing of Aluminum." Mr. Petit told the story of the discovery of aluminum and development of the industry. He touched on the various processes for finishing aluminum which are now used or have been used in the past. He then went into detail of some of the newer and unique processes and illustrated this portion with color slides. At the conclusion of his prepared talk he

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answered questions which indicated the interest his presentation had stirred in those who heard him. He was warmly thanked for his informative talk.

Robert L. Garrett
Secretary

LOS ANGELES
Panel on Waste Treatment; Eddy to Visit Branch

The regular monthly meeting of the Los Angeles Branch was held at Rodger Young Auditorium on Wednesday, Feb. 12. There were 69 members and guests present.

Following the dinner, President **George Magurean** opened the business meeting at 8:15 p.m. As the first order of business, the guests were introduced by our sergeant-at-arms, **Milton Weiner.**

President Magurean then called upon **Earl Arnold,** as chairman of the nominating committee, for the recommendations for the slate of officers for the 1958–1959 term. The recommendations of the nominating committee are as follows: **Norman McEwan,** president; **George Hetz,** 1st vice president; **Frank Virgil,** 2nd vice president; **Emmett Babcock,** treasurer; **Kenneth C. Johnson,** secretary; **Harvey K. Hunt,** librarian; George Magurean, **Ed Wells, Truman Stoner,** Board of Governors.

Ken Johnson, Research Committee chairman, then gave a report on the status of the sustaining member program of the Los Angeles Branch and gave a good resume of the activities and advantages offered by the AES Research program.

Norman McEwan, chairman of the Membership Committee, introduced two prospective members and three elected members who were inducted into membership by President Magurean.

Phil Simon, chairman of the annual Technical Sessions, gave a full report on the annual Banquet and Dance. The technical program, arranged by our very capable librarian, Frank Virgil, will be of exceptional caliber and interest. All in all, it is shaping up as the best of our Technical Sessions. Phil Simon and his crew have done an outstanding job and deserve a resounding vote of thanks from all.

President Magurean then announced that National President **Francis T. Eddy** would be in Los Angeles on April 22 and there would be an officers' meeting with him at Rodger Young Auditorium, open to all interested members.

The meeting was then turned over to Frank Virgil who introduced the members of the panel, headed by **Sid Solomon,** who discussed the problem of "Waste Treatment in the Plating Room." Panel members were Sid Solomon, Water Conditioning Co. Moderator; **Robert Coombs,** Crown City Plating Co.; **Royce Griffith,** Aerojet-General Co.; **George A. Bell,** City of Los Angeles Sanitation Dept.

After short presentations by each member of the panel, a very lively discussion period followed. The active and lively participation by members from the floor, showed the degree of interest in this subject in the Los Angeles area.

Emmett H. Babcock
Secretary

LOS ANGELES
McEwan Elected 1958-1959 President

The regular monthly meeting of the Los Angeles Branch was held at Rodger Young Auditorium on Wednesday evening, March 12. There were a total of 57 members and guests present.

President **Magurean** called on Sergeant-at-Arms **Milton Weiner** to introduce the guests. **Mrs. Verna Ott** was appointed to obtain information on the small size lapel badges she proposed for the members to wear at each meeting. The sergeant-at-arms will look into the feasibility of having a bar in the meeting room on a trial basis.

The result of the letter ballots on the Constitution and Bylaws and the fiscal year was then presented by the secretary and the effect of the change in the fiscal year explained to the membership.

Phil Simon, general chairman, made a full report on the annual Technical Sessions to be held at the Ambassador Hotel on Saturday, March 22. **Frank Virgil,** Technical Chairman of the sessions, had to announce a change in the program. **Ray Ledford,** of Industrial Filter and

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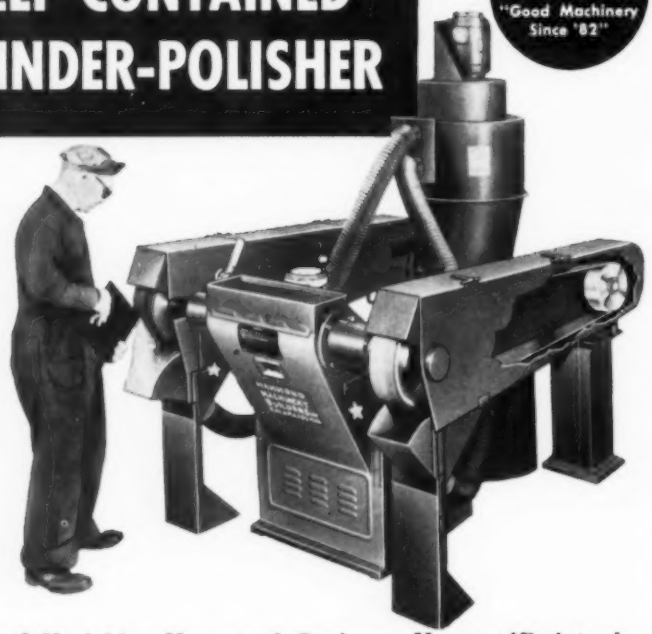

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Pump was forced to cancel h's appearance due to pressure of business. In his place, **Leo Missel,** of Lockheed Missile Systems Division will present a paper of great interest.

As there was no new or old business, the meeting was then turned over to the election of officers for the 1958–1959 term. The slate selected by the nominating committee was placed before the membership in order and several nominations were made from the floor. When the ballots had been counted, the officers elected for the 1958–1959 term of office for the Los Angeles Branch were all those listed in the preceding report of the February meeting except that **Don Baudrand** was elected secretary.

Emmett H. Babcock
Branch Secretary

MILWAUKEE

LaQue Speaks on Corrosion

The 486th meeting of the Milwaukee Branch was held Feb. 14 at the Ambassador Hotel. This dinner meeting was held jointly with the American Chemical Society and the National Association of Corrosion Engineers. President **E. H. McCoy** delivered an excellent resume on the history, purpose and activities of The American Electroplaters' Society.

The speaker for the evening was **Francis LaQue,** vice president in charge of development and research at the International Nickel Co., who has had a lifelong interest in the field of corrosion of metals. The paper presented was "Corrosion and Protective Coatings." This was a timely subject since corrosion and its control constitutes one of the major problems of our economy. The cost and losses occasioned by rusting and corrosion of machinery, equipment, structures and facilities constructed from iron, steel and aluminum are tremendous and growing.

The assumption taken by the speaker was that a coating may be imperfect or have been impaired so as to expose at least a small area of the underlying material to electrolytic action. The discussion then dealt with what may happen after determining the location of the cathode or cathodes in a corrosion circuit in respect to the anode and the coating. Both organic and inorganic coatings were considered.

Following a lively question and answer session, the membership gave a rising vote of thanks to Mr. LaQue, a dynamic personality and an effective speaker.

S. Taterzynski
Secretary-Treasurer

MILWAUKEE

Piellusch and Plewa Present Papers

The 487th meeting of the Milwaukee Branch was held March 7, at the Maryland Hotel with **E. H. McCoy** presiding.

Four new members were elected to membership.

Frank Marshall, chairman of the Membership Committee, recommended that a rotating membership committee be formed, consisting of six members with two men being replaced each year by new members. The matter was referred to the Board of Managers for consideration.

Les Diveley reported on the Midwest Regional Meeting held in Chicago.

A Nominating Committee was appointed by the president consisting of the following members: **Robert Steurnagle, Henry Bornitzke** and **Ben Coughlin.** The committee was instructed by the chair to present a slate of officers and delegates at the May meeting.

An announcement was made regarding the Rockford Annual Meeting, March 15.

Correspondence from the National office and other Branches was read by the secretary.

The meeting was turned over to **Gene Piellusch,** the educational chairman, who presented the speakers of the evening. **Louis Schustik,** field service representative of E. I. du Pont de Nemours and Co., spoke on IMPURITIES IN CYANIDE PLATING SOLUTIONS. The Organic Section was addressed by **Milton S. Plewa,** a sales engineer for the Ransberg Electro-Coating Co. Mr. Plewa had presented a most interesting film entitled THE BIG ATTRACTION.

S. Taterzynski
Secretary-Treasurer

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MOHAWK VALLEY

Squitero and Sonnenfeldt Speak to New Branch

A. D. Squitero, Chief Chemist for the Hansen-Van Winkle-Munning Co. of Matawan, N. J., spoke on "Bright Nickel Plating" at the February meeting. The subject was well received by our area members who operate nickel baths. A very lively question and answer period followed the discussion.

The March meeting of the Mohawk Valley Branch was well attended and for a very good reason. We were pleased to have **Rene Sonnenfeldt,** of the Sel-Rex Corp., speak to us on the "American Compared to the European Plating Practices." This subject and the speaker proved to be both informative and entertaining. Mr. Sonnenfeldt was very much at home during the question and answer period, having traveled extensively in the European countries where many questions are asked relative to the plating field.

Charles P. Rachm Jr.
Secretary-Treasurer

NEW YORK

King Details Construction Materials

Dr. Edward Saubestre, president, called the Feb. 28 meeting to order at the Hotel Statler.

A moment of silence in memory of the passing of Honorary Member **Anthony Henry** was observed.

This being an open meeting all business was dispensed with and Librarian **Arthur Carlson** took over to conduct "Good and Welfare." Artie introduced us to **Robert King** of Heil Process Equipment Corp. of Cleveland, Ohio. Mr. King's paper, "Materials for Construction of Equipment in Plating Operations" was thoroughly informative in that it covered practically every piece of equipment used in plating today. Also with the aid of slides, he described the newest materials which are being used for plating room floors and for the construction of fume scrubbers, the gases neutralizers.

Anthony P. Briganti
Recording Secretary

PHILADELPHIA

Parker on Gold Alloy Plating; Farren Next Prexy

The regular meeting was held at the Engineers Club on March 24 with 43 at dinner and about 50 at the meeting. **W. Dawson,** Louisville Branch, was introduced as a guest. Three active members were admitted and six applications were received. Mr. Cogan announced the confirmation by the Sheraton Hotel of November 1 for the Annual Banquet; the committee will decide the date and place of the Annual Educational Session.

The minutes of the previous meeting were read and approved; the treasurer's report was given. Mr. Hoffman stated that two meetings of the Branch Bylaws Revision Committee had been held and a preliminary draft of the revision was being presented to the next Executive Group meeting; a complete draft was to be ready for consideration at the April meeting.

The following were elected for the 1958–59 term, to take office on July 1, 1958: President, **Robert L. Farren Jr.;** first vice president, **James E. Cogan Jr.;** second vice president, **Edward M. Hoffmann Jr.;** secretary, **I. Wm. Marcovitch;** treasurer, **Paul Mentzer Sr.;** librarian, **Irvin K. Hauseman;** Board of Managers, **Vincent Casswell;** Delegates: **Dr. Samuel Heiman,** I. Wm. Marcovitch, James E. Cogan Jr.; Alternates: Robert L. Farren Jr., **William H. Trusdell,** Paul Mentzer Sr.

Dr. Samuel Heiman introduced **Dr. Edward A. Parker,** Technic, Inc., who spoke on "Heavy Gold Alloy Plating." Dr. Parker discussed the use of gold-antimony alloys in the manufacture of transistors, of gold deposits with less than 1 per cent of nickel for high frequency contacts. Also described were gold-silver alloys.

I. Wm. Marcovitch
Secretary

PITTSBURGH

Jacke Speaks on Ultrasonic Cleaning

The January meeting of the Pittsburgh Branch was held at the Gateway Plaza in Pittsburgh, Wednesday, January 8. Seventeen attended dinner before the business meeting which was attended by approximately 35 members and guests.

The Branch elected two new members.

President **Herb Schram** appointed the following members to serve as nominating committee for the 1958–1959 officers: **E. J. Smith,** chairman; **R. E. Varner, R. A. Woofter** and **Myron Ceresa.** They will present their slate of candidates to the Branch at the February meeting.

The guest speaker of the evening was **Stanley A. Jacke** of Detrex Chemical Corp. Mr. Jacke spoke on ultrasonic cleaning and demonstrated its use with the actual equipment and some slides.

Before adjournment, **Bruce Wilson** of Pennsalt Chemicals, who is chairman of the annual Ladies Night Banquet, presented the door prize of two complimentary tickets to the lucky member whose name was drawn from the hat. The winner was one of the Branch's newest members, **Blyde Mungall** of Pitt Quality Plating. Mr. Wilson plans to give tickets away at each meeting until May.

The Banquet is Saturday, May 10, at the Gateway Plaza.

Fred Stevens

PITTSBURGH

Project 15 Discussed by Musmanno

The February meeting was attended by 35 members and guests for dinner. Eleven members of the Auxiliary attended dinner before going to the Nixon Theatre for the evening performance of "The Diary of Ann Frank."

Following dinner, President **Herb Schram** opened the business meeting. Several communications were read by Secretary **Fred Stevens** and appropriate action recommended.

Ed Smith, chairman of the nominating committee, presented the slate drawn up by the committee. It is as follows: **J. R. Crain,** president; **W. F. Pizoli,** 1st vice president; **W. F. Stevens,** 2nd vice president; **E. B. Keller,** secretary; **R. E. Woehrle,** treasurer; Board of Managers: I. H. Schram, **R. E. Varner, Myron Ceresa;** Delegates: J. R. Crain, R. E. Varner, E. J. Smith; Alternates: Myron Ceresa, **R. J. Goldbach,** I. H. Schram.

Ed Smith gave a report as one of the Branch's delegates on a ballot sent to him and the other delegates concerning the payment of 15 month per capita tax this year due to a change in the fiscal year. A lively discussion of the situation followed. Twelve month dues notices have been prepared for mailing. Mr. Smith read a letter of protest which he submitted to the Executive Board of the Supreme Society on the handling of this matter.

Librarian **W. J. Musmanno** presented the evening's speaker who was **William J. Pierce** of Harshaw Chemical Co. Mr. Pierce discussed the work done on Project 15 and the use of accelerated corrosion testing by the Corrodekote method.

The winner of the free Ladies Night tickets was **Jacques Lussier. Harry Flister** of Wyandotte Chemicals donated them.

Fred Stevens

ROCHESTER

Burkard Talks on Chem Milling

The March meeting was held at the Rochester German Club. The meeting was called to order by President **Frank Beuckman.**

Business matters discussed were the 4th Annual Empire State Regional Meeting to be held in Rochester on April 17, 1958 at the Hotel Manger, and the budget problem which has been confronting the Branch.

The speaker of the evening was introduced by Librarian **Lorrin Correll. P. N. Burkard,** manager of the Industrial, Railroad & Aircraft Depts. of the Wyandotte Chemicals Corp., talked on chemicals and their function in metal cleaners. The process of chemical milling of aluminum, magnesium and steel was

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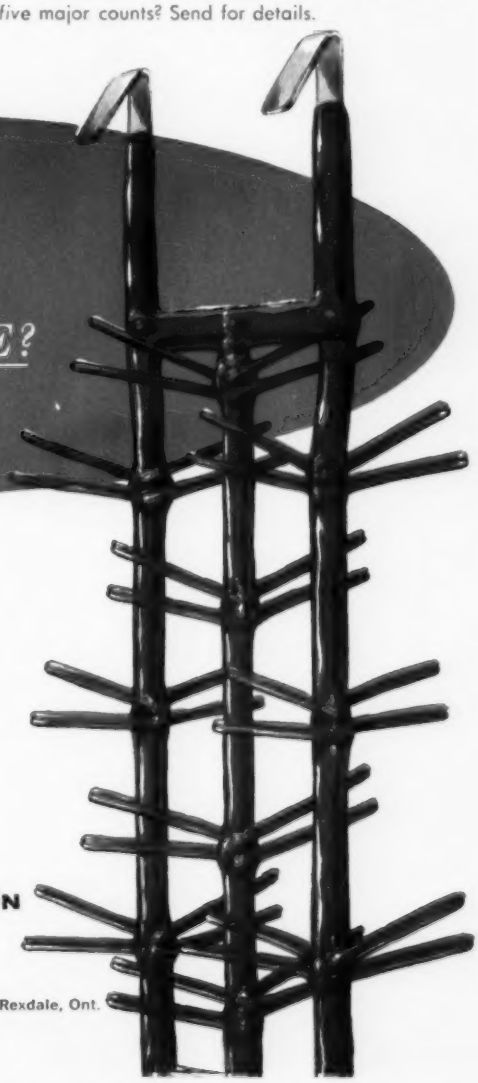

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presented as well as samples shown of this process on aluminum and magnesium. Mr. Burkard's talk was extremely interesting and most informing on chemicals in use today in the cleaning field of modern electroplating.

Linwood P. Morrison
Treasurer-Secretary

ST. LOUIS

Dues Increase Voted; Jackson is Speaker

The regular monthly meeting of the St. Louis Branch was held at the York Hotel, Wednesday, Feb. 13. When only 20 people were present for dinner it was thought the 10° weather would limit our attendance. We were fortunate that 31 members and guests were present when the business meeting was called to order.

Eugene Conroy reported there were 10 tables available for our spring banquet. Tickets could be purchased from **Louis Berra.**

George Koderhandt, chairman of the Welfare Committee, reported flowers had been sent to the Miller family after we heard about the passing of **Paul Miller,** a long time member of the St. Louis Branch.

Mr. Julius reported the business discussed at the Interim Meeting which he and **Robert Coulson** attended at Indianapolis. He said the issue of raising the dues is sure to become a factor at the next business meeting. He mentioned that some branches have successfully organized an organic division.

Craig McAlister, our chairman, reported that the Board of Governors had met at his house and discussed the possibility of raising the dues of the St. Louis Branch. They decided the dues should be raised to 12 dollars and Second Vice President **William Piel** made the motion to raise the dues from 9 to 12 dollars. The motion was seconded by **Frank Menniges.** Many questions followed. A long discussion was held which helped the motion to pass with no opposing votes.

At this point Librarian **Ruel Shumway** introduced the speaker of the evening, **Joseph L. Jackson,** head of research and development of R. O. Hull & Company, Cleveland, Ohio. His talk was accompanied by slides. Many questions were asked which indicated the interest of the audience.

Ward Kelly
Secretary

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SOUTHEASTERN

3rd Annual Technical Session

The Southeastern Branch, in combination this year with the Blue Ridge and Miami Branches, held its 3rd Annual Technical Session on February 14 and 15, 1958 at the Dinkler Plaza Hotel in Atlanta.

General Chairman **Howard Bone** opened the meeting and after a few words from Branch President **Charles Lewis** and National President **Francis T. Eddy,** and recognition of National Past President **Dr. Samuel Heiman,** the Miami President **Duke Dent** and Blue Ridge 1st Vice President **Dr. N. F. Murphy,** we boarded two buses and went to Scripto, Inc. for a plant tour. At Scripto we were guided through this fascinating mass production plant by Branch Past President **Clyde Stovall** and Librarian **Wilmont D. Tidd.**

On Friday afternoon we heard **Henry Mahlstedt** of Metal & Thermit Corporation on "New Concepts in Corrosion of Chromium Finishes" and **R. V. Vanden-Berg** of Aluminum Company of America on "Recent Developments in Aluminum Anodizing."

Meanwhile the ladies, under the chairmanship of **Mrs. Charles I. Lewis,** assisted by **Mrs. H. M. Bone** and **Mrs. Clyde Stovall,** were enjoying lunch at the Standard Town and Country Club, a fashion show and the infamous Cyclorama.

Saturday morning we heard **Herman Ey** of H-VW-M Co. on "Cleaning Aluminum," **Clarence H. Sample** of International Nickel Co. on "Specifications and Tests of Electrodeposited Coatings," and **Dr. Richard B. Saltonstall** of Udylite on "Nickel Plating."

Several of the job shop men had lunch with the officers of the National Association of Metal Finishers and formed a local chapter for Atlanta and Miami. NAMF officers present were President **John Palik,** 1st Vice President **Harold W. Baker,** Executive Secretary **P. Peter**

Kovatis, Secretary-Treasurer **Frank Kaiser,** Assistant Secretary-Treasurer **Sal Novelli,** Directors **Mariano Ranno** and **George W. Taylor.**

At 2 p.m. on Saturday the first joint committee of the Southeastern, Blue Ridge and Miami Branches met and drew tentative bylaws for the proposed Dixie Region. Miami was represented by M. H. Dent, **J. Gibbs,** and **F. X. Marinello;** Blue Ridge was represented by Dr. N. F. Murphy, **Howard Welfare,** and **Bruce Wallace;** and the Southeastern was represented by Clyde Stovall, George W. Taylor, and **Robert H. Probert.** George Taylor was elected chairman.

The purpose of the regional organization is to conduct regional meetings to foster the advancement of the science of electroplating. Saturday night the Southeastern rolled out its traditional feast. The banquet was begun with the National Anthem (Dixie) and then came steak, wonderful floor show, and dancing to the music of Albert Coleman and orchestra. The committee who staged the 3rd Annual Technical Session were General Chairman Howard Bone, **M. M. Randman** (Registration), Wilmont D. Tidd (Education), **Justis V. Belville** (Entertainment), George W. Taylor and Bob M. Taylor (Program), Robert H. Probert (Secretary-Treasurer).

SOUTHEASTERN

Nalley Elected President; Murray on Preparation

The Southeastern Branch held its regular monthly meeting on Friday night, March 14, at the Belmont Steak House in Atlanta with 36 members and guest present. **William K. Murray,** manager, Technical Section, Enthone, Inc., spoke on "Adhesion of Electrodeposits and New Methods of Cleaning and Oxide Removal."

Plans were announced to form a Dixie Regional organization consisting of the Southeastern, Miami and Blue Ridge Branches to sponsor annual technical meetings.

New officers elected were **Claude J. Nalley,** president; **Bob M. Taylor,** 1st vice president; **Robert H. Probert,** 2nd vice president; **Mrs. Jerita Wilson,** librarian; **Wilmont D. Tidd,** treasurer; Robert H. Probert, secretary.

Robert H. Probert
Secretary

SOUTHERN TIER

Sonnenfeldt Discusses European Plating

Regular monthly meeting held at 7:30 p.m., March 18, at the Langwell Hotel, Elmira, N. Y. Approximately 23 members and guests enjoyed a fine dinner. In the nature of new business, printed copies of a suggested list of eligible members and proposed names for office for the coming year were distributed to those present and copies will be mailed to those members not in attendance.

Charles Bound, Charles Emery and **Morgan Rake** were nominated as delegates to a special luncheon meeting at the Rochester Regional in April. They will have voting power representing this branch on any decisions for future plans involving Regional meetings.

Mr. Emery, librarian, introduced the speaker, **Rene Sonnenfeldt** of Sel-Rex Corp. His topic was "Plating and Plating Procedures in the European Countries." In his talk he described European progress made in plating from the period prior to World War II up to the present. He pointed out that many of the ideas now incorporated in present plating processes used in the European countries came from this country, as great strides in progress were made in this country during and after the war years. He mentioned that there has been a great influence from the American supply house promoting better plating in Europe. It was felt by the speaker and those present that more should be done in this country to set up schools for platers.

B. Rossiter
Secretary

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SPRINGFIELD
New Slate of Officers Elected

The Springfield Branch met at Blake's Restaurant on Monday evening, March 24 for the monthly meeting and to hold the Branch election.

Robert Girard, chairman of the nominating committee, presented the selected slate of officers. On the committee with him were **John E. Costigan** and **Wayne B. Sanders.** The following members were nominated and elected: President, **Edward F. Koetsch Jr.** (2nd time); 1st vice president, **Elery C. Gibson;** 2nd vice president, **Raymond Howe Jr.;** secretary, **Henry L. Heissfeld;** treasurer, **George H. Mongeau;** librarian, **Alexander R. Salmond;** historian, John E. Costigan; and for research chairman, **Ernest E. Couture.** To serve as a Board of Managers, **Melvin P. Roske, Martin J. Murray** and **Louis E. Dupuis** were re-elected and **Joseph F. Mitchell** and **Charles F. Griffin Jr.** complete the Board. The Branch Secretary cast the deciding vote.

Six new members were welcomed into the Branch.

William Jones and **Armand Faucher** of Chemical Corp., **Ralph McCahan** of Dupont, **George Colombie** of Apothecaries Hall, and **Edwin Jarm** of American Abrasive were out of town visitors to the meeting.

The Branch Secretary announced that the Springfield Branch has been duly accepted as a charter member of the newly organized Valley Council of Technical Societies, Inc. At present, fourteen societies are representative of the Council with the president and secretary as official authority in each group. No individual membership is allowed.

Henry L. Heissfeld
Secretary

SYRACUSE
Grady Talks on Organic Finishes

The March meeting was held at the Turn Hall, 619 No. Salina St., Syracuse. President **Allen Gutekunst** presided. Twenty-eight members and guests were present.

At the business meeting, two new members were elected. A report was given by the chairman of the nominating committee on the slate of officers for the coming year.

Frank Beuckman of the Rochester Branch gave a short talk on the Empire State Regional Meeting to be held in Rochester, April 19.

Robert Donaghey, librarian, introduced the speaker of the evening, **Joseph Grady** of Strathmore Products. Mr. Grady gave an interesting talk on the basic organic finishes and their development.

Refreshments were served, courtesy of Frederick Gumm Chemical Co.

TOLEDO
Badaluca Is Speaker; Grutter New President

The March meeting of Toledo Branch was called to order by President **Merlin Parker** with 26 members and guests present.

Before the annual election, **James Badaluca** of Hanson-Van Winkle-Munning Co. gave a very interesting illustrated talk on "The Story of Tripoli as an Abrasive."

The following members were elected to office: **Harold Grutter,** president; **Donald Dettinger,** 1st vice president; **Glenn Noe,** 2nd vice president; **Ben Gomersall,** secretary-treasurer; **Edward Agnew,** librarian; **Cleon Triplett,** Merlin Parker and **Paul Weaver,** Board of Managers.

The newly elected president appointed **James Follas** as Research Fund chairman. A round of applause was given to the past officers and to the salesmen that have been cooperating with the branch in supplying refreshments during the meetings.

Ben Gomersall
Secretary-Treasurer

TWIN CITY
Nickel Plating Discussed by Sanborn

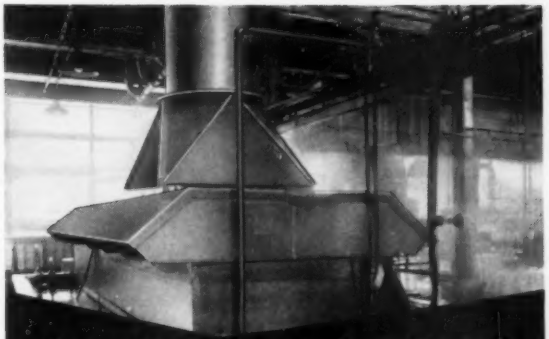
The Twin City Branch held its regular monthly business and technical meeting at Jax Cafe in Minneapolis, Minn., on March 3. Forty-six per cent of the membership and five guests were present.

Our technical speaker for the evening was **Charles B. Sanborn** of International Nickel Co., Inc. His topic for the evening was "Industrial Nickel Plating." Mr. Sanborn's informative lecture was supplemented with a series of slides that displayed typical industrial applications for nickel plated coatings. After a short question and answer period, the group displayed their appreciation and the meeting was then adjourned.

WATERBURY
Petrocelli Returns to Present Technical Paper

The monthly meeting was held on Thursday, March 13, at the Roger Smith Hotel. The meeting was opened by President **Spencer Henn. Frank Eddy** named the slate of officers presented at the last meeting, and the following were elected to office: President, **Edward J. Garland;** 1st vice president, **Frank Tirendi;** 2nd vice president, **William C. Giesker;** librarian, **Louis Porretti;** assistant librarian, **Edward B. Washburn;** research chairman, **Raymond L. Mitchell;** publicity chairman, **Francis A. Schneiders;** secretary-treasurer, **Albert G. Griffith;** Board of Managers, **Theodore Voyda,** Spencer L. Henn and **Isidore Cross.**

Secretary Al Griffith gave a report on



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our membership status, and suggested the April meeting be designated as "Bring a Guest Nite."

We had the honor of having **John P. Nichols,** National Executive Secretary, with us at this meeting. He gave a brief report of the changes in the bylaws of the National Society. He also congratulated Ray Mitchell, chairman of the Research Program of the local branch for an outstanding record for Sustaining Membership.

The speaker for this meeting was **Dr. Joseph V. Petrocelli,** head of the Electro-Chemical Section, International Nickel Co., Bayonne, N. J. His subject was "Electrode Reactions in Electrodeposition and Corrosion." A large group turned out to hear our former president and enjoy his talk.

The Regional Meeting will be held in Hartford, on April 12. Frank Tirendi is educational chairman and Isidore Cross will act as technical chairman. The speakers for this event are **Henry Strow,** president of True Brite Chemical Products Co., and **Dr. W. Andrew Wesley,** manager, Research Laboratory, International Nickel Co.

Nicholas Topazio
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AES MEMBERSHIP REPORT

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Boston: S. Wein, D. R. Wessell
Chicago: E. Brunschon, G. R. Lea, F. C. Leensvaart, J. K. Trinz
Cincinnati: H. E. Coudret
Cleveland: F. Fanta, K. Froebe, R. O. Hull Jr., J. Jarus, E. B. Kopowski, J. E. May, J. V. Muckley, R. Pinchot, R. D. Savage, A. Schepponer, J. E. Siers
Columbus: N. E. Baker, C. T. Brown, R. C. Brown, R. B. Goebner, E. J. Little, J. R. Strom
Detroit: L. E. Anger, R. B. Bowman, T. E. Campbell, J. J. Stork, N. C. Wood
Grand Rapids: E. N. Danielson, W. L. Guiltinan, B. A. Ignasiak, D. Lachniet, T. C. Sinkinson, R. L. Tumbling, F. Winchester
Hamilton: A. H. Lee
Indianapolis: P. D. Girt, S. D. Green, G. F. Worton
Kansas City: H. B. Hoesly, M. L. Marcum, H. L. Oakes, D. L. Onwiler
Los Angeles: G. Bishop, W. O'Mara
Melbourne: D. W. Bloor, J. Coulthard, D. S. Crowe, J. J. Gabriel, R. S. James, W. J. Regan, W. R. Summerfield
Milwaukee: A. F. Cunningham, E. Doleschal, L. K. Graves, A. R. Price
Mississippi Valley: D. M. Booton, C. E. Grey, P. Glaudel, M. Hitch, C. D. Horton, P. Iwema, C. B. Mason, G. Mason, J. Mason, R. Powers, G. Spartz, R. Stuart, J. Stuart, J. E. Welsh
Montreal: A. G. Boulmier
Newark: N. I. Gaynes, S. Kriso, G. Thompson, M. A. Treuhaft, L. P. Vollmuth
Philadelphia: E. W. Centanni, J. J. Dougherty, J. Liwacz, D. E. Lundy, D. G. Scott, A. T. Huber
Providence-Attleboro: R. C. Prentice
Rochester: V. Bonaldi, B. Lindstrom, J. A. Pusey
Rockford: J. D. Mead, C. H. Retzke
Southeastern: L. L. Bowman, A. R. Frank, H. C. Sansom
Southern Tier: D. A. Novar
Springfield: D. S. Coleman, A. A. Delpeschio, J. E. Higgins, G. J. Juke, S. A. Panna, A. Zavarella
Sydney: W. J. Bracey, R. W. Isaacs
Syracuse: R. Hulland, T. Kohler, R. E. Moore, T. R. Werner
Toronto: A. D. Barraclough
Twin City: G. Cantin, B. Gross, V. Rosenblum
Western Ontario: L. Horodyski, J. H. MacKay
Member-at-Large: J. C. Stratton, Newtown, Connecticut

REINSTATEMENTS

Chicago: E. Jacobsen
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Rockford: S. C. Valentin
St. Louis: J. W. Beane, W. Sullivan

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Columbus: G. Skelly to Pittsburgh
Detroit: K. H. Wagner from Cleveland
Grand Rapids: I. M. Weiss from Cleveland
Los Angeles: W. A. Pardee from Cleveland
Milwaukee: C. N. Shepherdson to Mississippi Valley
Mississippi Valley: C. N. Sheperdson from Milwaukee
Newark: J. V. Petrocelli from Waterbury
New York: W. Gurzong to Chicago
Philadelphia: J. C. Instone to Blue Ridge
Pittsburgh: W. S. McCormick to Kansas City, J. P. Melhado from New York, W. G. Sittmann to Rochester, G. Skelly from Columbia
Rockford: R. Hood to Minneapolis
Southeastern: W. W. Lee to Buffalo
Waterbury: J. V. Petrocelli to Newark
Western Ontario: D. C. Smith to Toronto

RESIGNATIONS

Buffalo: D. D. Dalrymple, R. E. Sampson
Chicago: L. N. Peterson, T. DeMott
Cleveland: E. Hirakis, M. Kronenberg
Dayton: H. Pesa
Lancaster: W. Brandt Jr., M. Dellinger
Los Angeles: P. O. Kerrigan
Melbourne: T. T. Brown, R. Stork
Milwaukee: J. G. Bamberger, V. C. Germano A. W. Schmidt, N. A. Wismer
New York: C. Coscia
Pittsburgh: C. J. Hinton
Providence-Attleboro: W. S. Barton, E. G. Healy
Springfield: G. Ariotti, W. J. Dyber, M. B. Harding Jr., P. F. Lyman, E. T. Mish
Sydney: H. J. Ford, J. G. Maddams
Syracuse: A. Martineau Sr.
Toronto: K. E. McColm
Waterbury: F. S. Foster, R. E. Johnson, B. H. McGar, E. A. Sesselmann
Western Ontario: I. Dagneau, V. T. McCann

SUSPENSIONS

Buffalo: W. D. Holcomb
Chicago: A. S. Brumm
Dayton: C. P. Benson Jr., R. E. Collins, B. O. Eley, R. Fooksman, E. W. Kerman, R. McDowell, S. Shannon, M. B. Studebaker, D. D. Suter, R. C. Wolfe
Grand Rapids: J. Cole, J. J. Houston, H. J. Howell, C. H. Kelley, J. Lindsey, G. Plummer
Hartford: L. Denis
Lancaster: W. F. Allen
Melbourne: J. P. Luttick
Milwaukee: I. Birbaum, J. H. Durnford, H. J. Durnford, N. Rowe, W. A. Schultz
Newark: T. Monte, W. Spence
Providence-Attleboro: J. W. Shaw
Rockford: F. Manley
Southeastern: R. A. Elliott, J. C. Lanius, D. L. McArthur, E. McFarland
Toronto: R. G. Verbrugge

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SITUATION WANTED—Plating Chemist or Technical Director. Age 35—college graduate. Seven years experience in electrochemistry and electroplating in a large metal finishing laboratory and department including all phases of electroplating and anodizing, control, research, and development, troubleshooting and production. Prefer Metropolitan Area. Reply to Box MA1, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Chemist, B.S. degree. 36 years of age. 15 years experience includes all phases of electroplating, including control, research, trouble shooting, installation and production. Extensive experience plating on magnesium. Desire Mid-West location. Reply to Box MA2, PLATING, 445 Broad St., Newark 2, N. J.

INDUSTRIAL CLEANING CHEMIST—Young, aggressive, specialist in metal and all phases of industrial cleaning, also allied chemical specialties; experienced formulation, development, sales, service, management, production supervision and purchasing. Reply to Box MA3, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED— Chemical Engineer with 10 years experience in processing automotive components, laboratory control, solution maintenance, and supervision. Prefer Mid-West location. Reply to Box MA 4, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Plating and polishing foreman. 23 years production supervision experience. Operate and control: copper, nickel, chrome, cadmium, zinc and gold. Knowledge of punch press operations and electronics. Firm moved South—position in Delaware Valley preferred. AES member 12 years. Reply to Box MA5, PLATING, 445 Broad St., Newark 2, N. J.

CHEMIST—Experienced in research for development work in buffing and polishing compositions. Mid-West location. In reply give complete background. Reply to Box MA6, PLATING, 445 Broad St., Newark 2, N. J.

RESEARCH CHEMIST OR CHEMICAL ENGINEER—A man of ability and initiative is required for research and development of metal finishing specialties by a progressive, reputable, expanding national organization. A challenging, interesting position is offered to one capable of working without detailed supervision. Liberal profit sharing and retirement benefits. Suburban New York location. Reply in detail to Box MA7, PLATING, 445 Broad St., Newark 2, N. J.

WANTED—DISTRIBUTORS AND SALES REPRESENTATIVES. A leading eastern manufacturer of a complete line of buffing and polishing compounds has open territories for Distributors or Sales Representatives. If you have experience and a following in the field, please write to Box MA8, PLATING, 445 Broad St., Newark 2, N. J. for further particulars.

DISTRIBUTORS WANTED—For South and Southwest. Long established Manufacturer of Metal Cleaning, Burnishing, Deburring, Aluminum Treating, and related Compounds seeking connections with reputable Distributors. Reply to Box MA9, PLATING, 445 Broad St., Newark 2, N. J.

SALESMEN—Distributors, Jobbers and Manufacturers Agents, with metal finishing contacts preferred, to distribute and sell the complete line of McAleer's Polishing and Buffing Compounds in spray, paste and extruded bars. Write or phone: McAleer Manufacturing Corp., 101 S. Waterman, Detroit 17, Michigan. VInewood 3-5970.

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GENERAL MANAGER WANTED: Northeast area. Sizable, growing, up-to-date, finishing plant specializing in electroplating and anodizing for electronics industry has opening for general manager to take direct supervision over approximately 40 in personnel, all facilities, estimating, and production. Technical as well as practical background, and experience in job-shop operations are sought. Starting salary up to $10,000 for right man. Future possibilities include advancement in management stature, with attendant salary increases. Please send complete resume educational and practical experience, and references. Will arrange to meet for personal interview. Please reply to Box MA11, PLATING, 445 Broad St., Newark 2, N. J.

TECHNICAL DIRECTOR—Medium Size-Shop, vicinity New York City. Burnishing, copper barrel plating, nickel barrel plating and gold barrel plating of small parts. To be in complete charge of time study, work flow analysis, quality control and price estimates. Salary $9000 to start. Advancement to Assistant General Manager and eventually General Manager. Reply to Box MA12, PLATING, 445 Broad St., Newark 2, N. J.

TECHNICAL SALES REPRESENTATIVE—Leading Eastern Manufacturer of Cleaning, Burnishing, Deburring, Aluminum Treating and Related Compounds, with Distributorship of complete line of Plating Equipment and Supplies, offers excellent opportunity to ambitious man under 35. Territory available includes Maryland, Delaware and part of South-Central Pennsylvania. Send complete resume. Reply to Box MA13, PLATING, 445 Broad St., Newark 2, N. J.

SITUATION WANTED—Available to do any or all of the following: setup, organize electroplating lab; supervise research; lay out, break in plating production plant; plan waste treatment and/or water-control facilities. Age 35. Send for resume. Reply to Box MA13, PLATING, 445 Broad St., Newark 2, N. J.

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FUTURE MEETINGS

AMERICAN ELECTROPLATERS' SOCIETY

May 18–22—**45th AES Annual Convention,** Sheraton-Gibson Hotel, Cincinnati, Ohio.

June 20—**Kansas City Branch,** Stag Party, Kansas City, Mo.

June 21—**Syracuse Branch,** Clambake, Wysocki's Grove, South Bay, N. Y.

July 26—**Detroit Branch,** Stag Day, Hillcrest Country Club, Mount Clements, Mich.

November 1—**Philadelphia Branch,** Annual Educational Session and Banquet, Hotel Sheraton, Philadelphia, Pa.

January 31, 1959—**Cleveland Branch,** Annual Educational Session and Dinner-Dance, Cleveland, Ohio.

June 14–18, 1959—**Golden Jubilee Convention and International Exposition, Including Fifth International Conference on Electrodeposition and Metal Finishing,** Detroit, Mich.

July 10–14, 1960—**47th AES Annual Convention,** Hotel Statler, Los Angeles, Calif.

INTERSOCIETY

May 18–20—**Metal Finishing Suppliers' Association,** Annual Convention, Sheraton-Gibson Hotel, Cincinnati, Ohio.

May 18–20—**National Association of Metal Finishers,** Annual Convention, Management Seminar and Banquet, Sheraton-Gibson Hotel, Cincinnati, Ohio.

June 9–12—**National Materials Handling Exposition,** and American Society of Mechanical Engineers National Conference on Materials Handling, Public Auditorium, Cleveland, Ohio.

June 14—**Masters' Electro-Plating Association of New York, 40th Annual Banquet,** Hotel Astor, New York, N. Y.

June 15–19—**American Society of Mechanical Engineers,** Semiannual Meeting, Hotel Statler, Detroit, Mich.

June 22–27—**American Institute of Chemical Engineers,** International Meeting, 50th Anniversary, Philadelphia, Pa.

June 22–27—**American Society for Testing Materials,** Annual Meeting and Exhibit, Hotel Statler, Boston, Mass.

June 26–27—**Society of the Plastic Industry,** Midwest Section Conference, French Lick-Sheraton Hotel, French Lick, Indiana.

September 12—**Society of Plastic Engineers,** Regional Technical Conference, St. Clair Inn, St. Clair, Mich.

Sept. 28–Oct. 2—**The Electrochemical Society,** Fall Meeting, Château Laurier, Ottawa, Canada.

November 18–20—**9th National Conference on Standards,** American Standards Association, Hotel Roosevelt, New York, N. Y.

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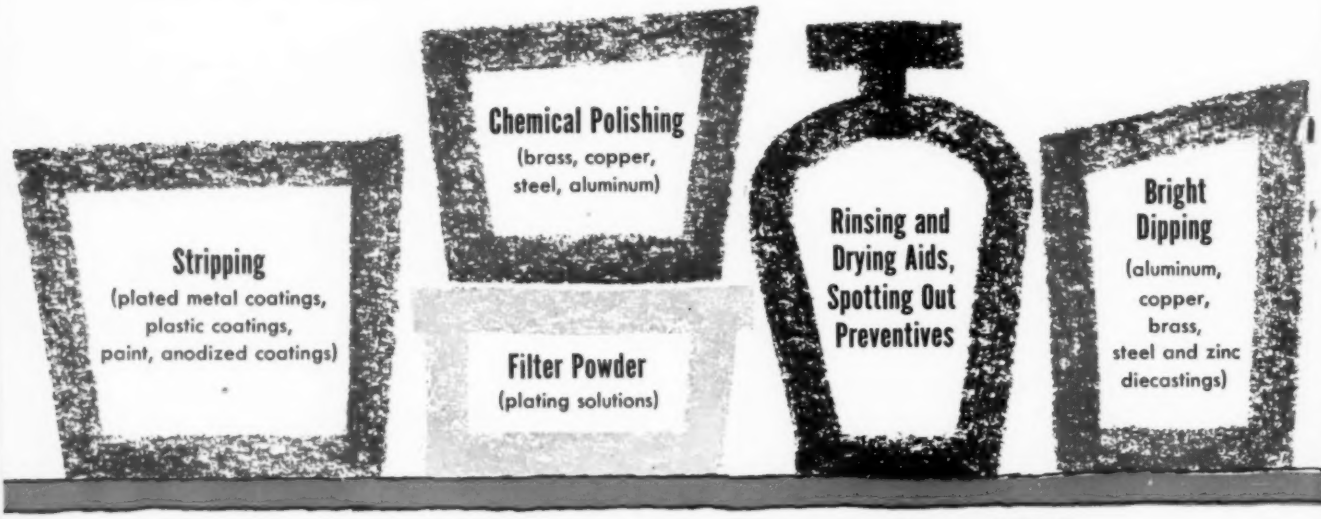

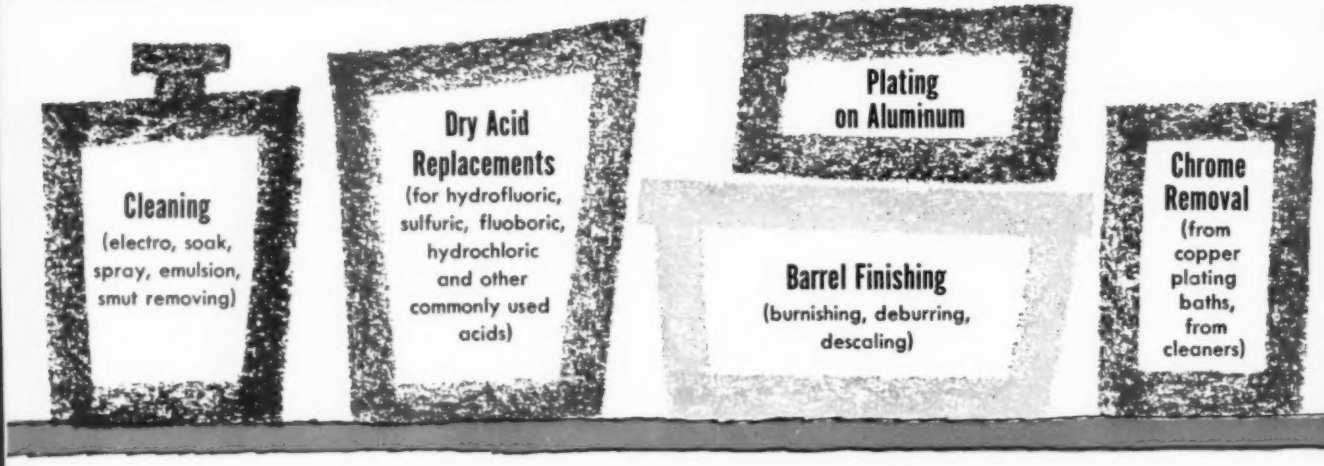
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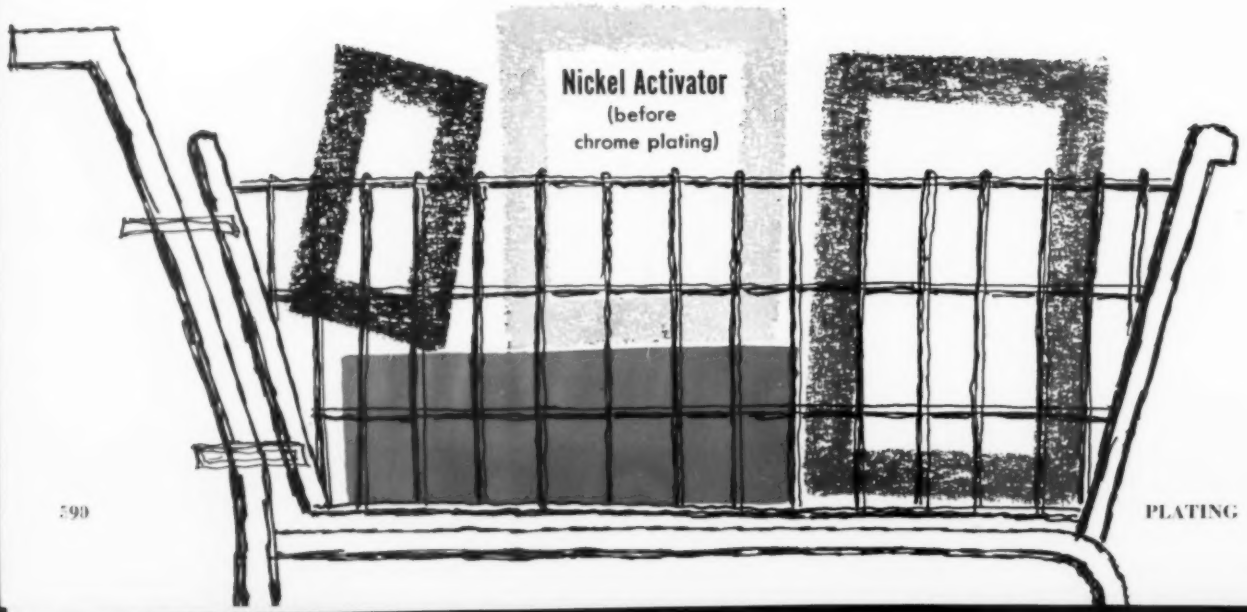

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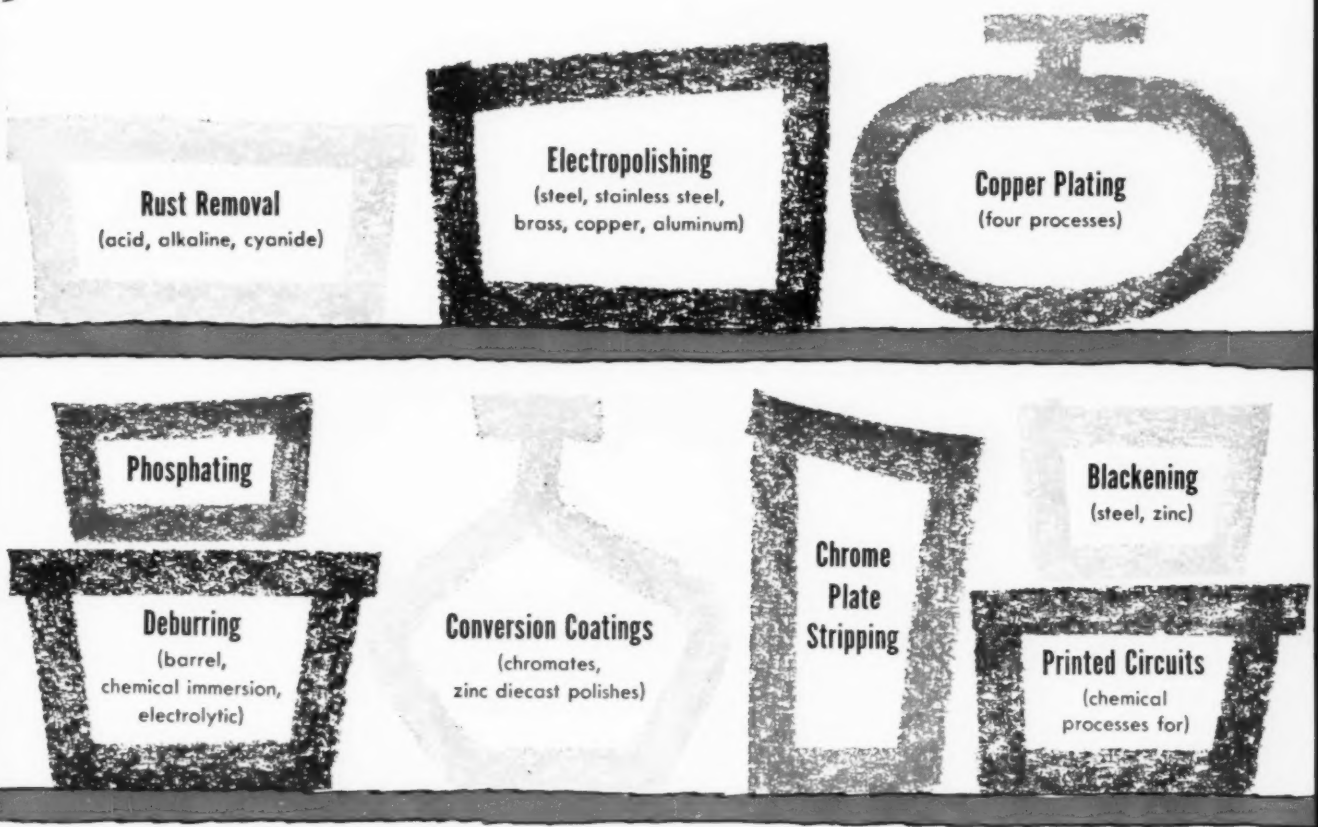

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